Expert Agency Critique of the Preliminary Final EIS and the Federal Action Necessary on the Proposed Pebble Mine Permit Application

Throughout 2019, expert agencies informed the U.S. Army Corps of Engineers (the Corps) and Pebble Limited Partnership (PLP) that more analysis and data is needed in order for the Pebble permitting process to comply with the National Environmental Policy Act (NEPA) and the Clean Water Act. For example, the Department of the Interior stated in July 2019 that "the [Draft Environmental Impact Statement (DEIS)] is so inadequate that it precludes meaningful analysis," and the U.S. Fish and Wildlife Service recommended "that a permit not be issued for the project as currently proposed." Expert input on the DEIS and associated process can be found here and here.

Subsequent to the DEIS, Congress included Pebble-related report language in the Department Of The Interior, Environment, And Related Agencies Appropriations Bill, 2020 (S. Rept 116-123), stating that it

> shares the agencies' concerns that the [Pebble] DEIS lacks certain critical information about the proposed project and related mitigation and therefore likely underestimates its potential risks and impacts. Sound science must guide Federal decisionmaking and all gaps and deficiencies identified in comments from Federal agencies and other stakeholders, including Alaska Natives, must be fully addressed, even if that requires additional scientific study, data collection, and more comprehensive analysis of the project's potential impacts. Adverse impacts to Alaska's world-class salmon fishery and to the ecosystem of Bristol Bay, Alaska are unacceptable.

This congressional language is consistent with the fundamental NEPA and common sense requirement that information in an EIS "must be of high quality" and allow for "[a]ccurate scientific analysis, expert agency comments, and public scrutiny."

Experts with the local, state, and federal governments, and in the tribal community, have now reviewed the Preliminary Final EIS (PFEIS) and submitted to the Corps formal comments on the nearly-final EIS document. This compendium gathers in one place the experts' formal input on the PFEIS for the proposed Pebble Mine Project, obtained via a FOIA request.

It remains the case that neither the Corps nor PLP has undertaken the work necessary to resolve the experts' concerns. As is clear from the expert input, PLP has failed to meet its burden to demonstrate that its proposed mine can co-exist with Bristol Bay's unparalleled wild salmon resource and fishing based economy, cultures, and way-of-life.

THE FEDERAL GOVERNMENT MUST DENY PLP'S APPLICATION FOR A SECTION 404 PERMIT FOR THE PROPOSED PEBBLE MINE.

May 6, 2020

More Information: Daniel L. Cheyette | Vice President, Lands and Natural Resources| Bristol Bay Native Corporation | 907.278.3602

Expert Comments on Preliminary Final EIS and 404 Permit Application

Alaska Department of Fish and Game, March 23, 2020 ›

Alaska Department of Natural Resources, March 23, 2020 ›

Alaska Department of Environmental Conservation, March 23, 2020 ›

U.S. Environmental Protection Agency, March 26, 2020 ›

U.S. Fish and Wildlife Service, April 2, 2020 ›

U.S. National Park Service, April 2, 2020 ›

Bureau of Safety and Environmental Enforcement, March 23, 2020 ›

U.S. Coast Guard, March 23, 2020 ›

Lake and Peninsula Borough, March 23, 2020 ›

Curyung Tribal Council, March 23, 2020 ›

Curyung Tribal Council, March 30, 2020 ›

Nondalton Tribal Council, March 23, 2020 ›

Nondalton Tribal Council, April 3, 2020 ›

TABLE OF CONTENTS

Expert Excerpts – The Pebble Mine Continues to Present Unacceptable Risks

Expert opinion on the PFEIS continues to demonstrate that the proposed Pebble Mine Project poses significant and unacceptable risks to the Bristol Bay wild salmon fishery. A sample of expert comments supporting this point are excerpted below; the full treatment of the issue can be found in the linked comments. Keep in mind that PLP CEO Tom Collier asserts that the PFEIS shows that the proposed Pebble Mine "can be developed without harm to the Bristol Bay fishery."[1] The expert comments on the PFEIS refute his conclusion and other erroneous claims to date about the thoroughness and transparency of the permitting process.

Alaska Department of Fish and Game, March 23, 2020:

> [PFEIS states that impacts to salmon] 'would be in the range of their natural population variability.' [...] [This] phrase is used frequently throughout the PFEIS in conclusionary statements regarding the impacts of the project. Usually without any actual data on numbers of individuals effected compared to existing populations. It is often misleading given documentation of significant impacts throughout the document. The hypothesized losses from the proposed project would not normally be considered within natural variability.

View Excerpt

U.S. Fish and Wildlife Service, April 2, 2020:

> [PFEIS] understates the impacts to aquatic habitats and fish.

View Excerpt

> The PFEIS fails to acknowledge that habitat destruction and degradation associated with mine development […] would erode the portfolio of habitat diversity and associated life history diversity that stabilize annual salmon returns to the Bristol Bay region.

View Excerpt

> The PFEIS takes the view that the elimination and degradation of salmon habitat will have incremental and linear (yet undetectable) effects on salmon populations, but collapses and extirpation of salmon populations from both coasts of the U.S. (and around the world) have shown that habitat loss and degradation from multiple sources can add up in ways that eventually lead to the demise of productive, self-sustaining salmon populations.

View Excerpt

Environmental Protection Agency, March 26, 2020:

> PFEIS does not acknowledge the critical importance or role of headwater streams.

View Excerpt

> PFEIS continues to minimize the importance of habitats […] across the landscape of a part of Alaska known to be the world's most productive sockeye salmon fishery.

View Excerpt

[1] PLP Press Release (Feb. 12, 2020), *Leaked Draft Final EIS Shows Encouraging Federal Permit Review for Pebble Project*

Curyung Tribal Council, March 23, 2020:

> The PFEIS admits that cultural resource surveys and ethnographic research is ongoing and incomplete. This information is critical to inform an analysis of the NEPA and LEDPA [Least Environmentally Damaging Practicable Alternative].

View Excerpt

Nondalton Tribal Council, March 23, 2020:

> The assumptions USACE are making about the need for current subsistence data to understand and evaluate potential impacts from this atypical project risk the way of life for many in the region. The Nondalton Tribal Council, Igiugig Village Council, and United Tribes of Bristol Bay do not agree with USACE's assumptions and request the agency collect current subsistence data.

View Excerpt

Expert Excerpts – Pebble's Plan is Unprecedented and Inadequate

Alaska Department of Natural Resources, March 23, 2020:

> [The water management pond] is recognized as unprecedented in size, adding additional uncertainty to its performance because of the proposed geomembrane liner.

View Excerpt

> The PFEIS should address how the post-closure water treatment, management and monitoring for centuries will be accomplished.

View Excerpt

> it is not clear that the PFEIS has considered risks, impacts, or mitigation of changes in operations or failures in the closure and post-closure periods and the respective obligations of the applicant.

View Excerpt

Alaska Department of Environmental Conservation, March 23, 2020:

> [PFEIS] now states 'The technical viability [of water treatment proposal] will require further evaluation during the permitting phase with the State of Alaska.' It is not clear if deferring analysis is appropriate.

View Excerpt

> [The fugitive dust control plan is] conceptual [] and should not be considered as a mitigation measure. [...] Either develop a more detailed plan or remove references to the fugitive dust control plan as a mitigation measure.

View Excerpt

U.S. Environmental Protection Agency, March 26, 2020:

> [V]iolations of water quality standards […] [are] reasonably foreseeable due to uncertainties related to the technical viability of the water treatment process.

View Excerpt

> We appreciate that the PFEIS discloses concerns with the proposed treatment processes, which we share. We agree that technical viability of the WTPs requires further evaluation. […] Since the proposed water treatment systems have not been

View Excerpt

commercially demonstrated at the scale of the Pebble Project, water treatment system changes could occur, therefore storage capacity is an important consideration for this project to ensure ability to manage and treat water to achieve water quality standards.

Consistent with our July 1, 2019 comments on the Section 404 public notice, once a complete draft CMP has been developed, including the evaluation and disclosure of specific mitigation projects, we recommend that the Corps provide an opportunity for public comment on the complete draft CMP.

View Excerpt

As stated in the PFEIS, 'there is much uncertainty in evaluating the stability of the mine site embankments based on a conceptual-level of design' (PFEIS, pg. 4.15-11). […] [I]n light of the serious potential [tailings dam] impacts, we continue to recommend that the EIS include a breach scenario for the [tailings dam] due to the four reasons described in [our DEIS] comment and the additional uncertainties raised [by] AECOM. Including a bulk TSF failure scenario in the FEIS will allow for disclosure of impacts to water quality and aquatic resources.

View Excerpt

It appears that no compensation is being provided for the permanent loss of more than 2,000 acres of wetlands in the Nushagak River watershed and that no compensation is being provided for more than 90 miles of permanent stream loss in the Nushagak River watershed. Based on available scientific information about the wetland and stream resources in the Nushagak River watershed and their importance to fish (e.g., Brennan et al. 2019) these kinds of losses would appear to necessitate consideration for 404 compensatory mitigation consistent with applicable requirements, including 33 CFR 332.3(f).

View Excerpt

Expert Excerpts – The PFEIS Obscures and Downplays Risk of Harm from Pebble

Alaska Department of Natural Resources, March 23, 2020:

[R]eliance on the subjective [] process within the Pebble PFEIS to estimate failure scenarios of the very large, tailings dams and the large, main water management pond dam, based on a marginally developed, conceptual design, and the exclusion of other risks including the other relatively large, water management dams, does not represent a thorough assessment of risk from potential failure modes and potential impacts.

View Excerpt

Moving the content of the pyritic Tailings Storage Facility (TSF) to the pit at closure does not appear to be reasonable, practicable or safe….

View Excerpt

Alaska Department of Environmental Conservation, March 23, 2020:

No support for conclusion that metals would be diluted to below ADEC groundwater cleanup levels.

View Excerpt

Alaska Department of Fish and Game, March 23, 2020:

> [PFEIS] claim that 'The substrate and physical characteristics of the tributary (NFK 1.190) are likely not suitable for spawning salmon…' is not supported by studies or surveys. View Excerpt

> ADF&G has provided comments on a number of occasions that there are multiple data needs in regards to brown bear movements, brown bear denning and foraging areas. The literature based analysis of the [] southern access route clearly shows that potential impacts are likely. However, the magnitude and extent of these impacts is largely unknown because these data gaps have not been investigated. Additionally, these data are needed in order to determine appropriate siting and design of facilities and appropriate mitigation measures. View Excerpt

> ADF&G believes impacts to bears, and bear related recreation (hunting and viewing), could be significant, given the information at hand. View Excerpt

> The conclusion that impacts to marine mammals would be of low likelihood and temporary is inconsistent with information provided within the PFEIS. View Excerpt

U.S. Environmental Protection Agency, March 26, 2020:

> [T]here is no supporting evidence in the PFEIS or the scientific literature to suggest that headwater streams are of low value. View Excerpt

> [T]he PFEIS does not adequately analyze the role and importance of groundwater to fish and fish habitat (i.e, for spawning, incubation, thermal regulation, overwintering, macroinvertebrates, cleansing and oxygenation of eggs), and consequences to fish from alterations in groundwater pathways. View Excerpt

> The PFEIS minimizes the Project's impacts on the Portfolio Effect and genetic diversity by footnoting and stating that, '...nor is genetic diversity expected to change....' and '...impacts to the Portfolio Effect are not likely to be discernable.' We note that the quoted statements do not appear to be supported by scientific literature or the data analysis included in the PFEIS. View Excerpt

> [The limitations of the salmon habitat impact modeling tool] has repeatedly been identified to the Corps over the course of the 2008-2009 Technical Working Group meetings, in EPA's July 2019 comments on the DEIS, and during the November 2019 Technical Meetings. Neither the DEIS or the PFEIS [resolve these concerns]. View Excerpt

> We continue to recommend revising the analysis of impacts to fish habitat, and recommend revising the figures to present clear and accurate information. View Excerpt

Lake and Peninsula Borough, March 23, 2020:

> Given the lack of studies specific to Lake Iliamna, many of us remain concerned about the potential effect of the ferry on juvenile salmon. We strongly recommend that additional work, based in Lake Iliamna, be completed before permits are issued.

View Excerpt

Curyung Tribal Council, March 23, 2020:

> ADF&G [] has found salmon presence in stream locations surveyed by PLP [] where PLP found no salmon present.

View Excerpt

Nondalton Tribal Council, March 23, 2020:

> A major data gap in the PFEIS is that all waters with anadromous or resident fish have not been identified. The PFEIS continues to rely on an old and incomplete data set that includes only a few days of observation in a few places. Fish move widely and far, occupying different habitats within a watershed from year to year. Therefore, looking at a stream very briefly, one time on one day is not enough to determine if that stream is used by fish. Fisheries professionals working in the area typically visit streams and specific study locations a number of times over a 3- to 5-year period to try to capture the variability of stream use by salmon and other fish from a system perspective. It is common knowledge that a stream sample site that seems to have low population numbers one year may have extraordinarily high numbers of fish at a different time of the year, or in different years.

View Excerpt

AECOM, Technical Memorandum, December 13, 2019:[2]

> testing completed to date on the bulk tailings has been minimal. […] Thus, the summary of expected particle size sorting behavior […] in the RFI response [from PLP] is incomplete and misleading. […] The ability to operate as a flow-through drained facility can only be confirmed with Pebble-specific tailings testing […] We remain concerned that there are uncertainties as to whether the 55 percent thickened tailings planned by PLP would segregate enough to promote reduction of the phreatic surface near the embankment, which translates to uncertainties regarding the effect of tailings segregation on embankment stability. […]

View Excerpt

> There is concern that some and perhaps all of the entire centerline part of the bulk TSF main embankment (not just the uppermost raise) could slide into potentially undrained tailings and have consequent effects in a downstream direction.

View Excerpt

[2] AECOM, Technical Memorandum to Bill Craig, AECOM (Dec. 13, 2019), Pebble Project EIS – Bulk TSF Embankment Seismic Stability Analysis, at pp. 1-2, available at https://pebbleprojecteis.com/files/86882482-1f9a-4846-8fa5-354c4f5a8230.

Federal Action Necessary

The comments on the PFEIS demonstrate that 1) the experts continue to express deep concerns with the content and integrity of the Corps' permitting process, and 2) the Corps continues to reject the expert input and congressional direction, and is forging ahead with a plan to release a Final EIS and Record of Decision in mid-2020 with a grossly inadequate and unsupported conclusion that the proposed mine "would not be expected to have population-level effects on fish and wildlife."[3]

Despite the consistent expert input over the last year detailing deficiencies in the EIS documents, the Corps refuses to prepare a version of the EIS that fully addresses the experts' concerns and release that document as a new Draft EIS for public review and input. The Corps appears to reject this approach because addressing these issues would, of necessity, require a change to the Corps' and PLP's desired mid-2020 schedule for a permit decision. At no point has the Corps identified a national interest that justifies proceeding in this truncated and fast-track manner and apparently prioritizing the interests of the permit applicant over the interests of the region's many stakeholders that have been actively engaged in this process for the last 2-plus years.

The Corps also recently rejected multiple requests from Bristol Bay tribes and other stakeholders for pandemic-related extensions to permitting process deadlines. Bristol Bay knows all too well the devastation that a pandemic can bring to the region, as the Spanish Flu horrifically demonstrated in the spring of 1919. The current all-encompassing focus in Bristol Bay is in addressing whether and how to undertake a 2020 commercial salmon season, which leaves little room for participating in the myriad of Pebble permitting-related activities. The Corps' unreasonable and arbitrary fealty to its schedule is also evident in its cavalier and callous disregard of Bristol Bay's focus on addressing health and safety in response to the pandemic emergency.

In the 2020 Appropriations report language, Congress provided context and direction for the current situation. It stated that

> To the extent [Federal agencies] are not satisfied with the Army Corps' analysis of the project, the agencies are encouraged to exercise their discretionary authorities, which include EPA's enforcement authority under the Clean Water Act, at an appropriate time in the permitting process to ensure full protection of the region.

To "ensure full protection" for Bristol Bay the federal government must not issue a Section 404 permit to PLP for the proposed Pebble Mine. This can be accomplished in one of two ways. First, the Environmental Protection Agency can use its authority under Section 404(c) of the Clean Water Act to prohibit the Corps from issuing a Section 404 permit for the proposed Pebble Mine. Alternatively, the Corps could deny the permit because the proposed mine would result in significant degradation of waters of the United States or because the mine is contrary to the public interest.

The Corps has run roughshod over science, law, and congressional direction in the Pebble permitting process. In managing the permit process with blatant disregard for the input of tribal and other Bristol Bay experts and stakeholders, the Corps has also lost the trust of the vast majority of the people of Bristol Bay. In short, the Corps simply is not prepared to make an objective, science-based decision.

The record is clear: the federal government should not issue a Section 404 permit for the proposed Pebble Mine.

[3] Preliminary Final EIS Executive Summary, at page 36. *See also, id* at page 35 ("no population-level decrease in resources would be anticipated.").

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Natural Resources

OFFICE OF PROJECT MANAGEMENT & PERMITTING

Po Box 111030
Juneau, Alaska 99811-1030
Main: 907.465.6849
Email: kyle.moselle@alaska.gov

March 23, 2020

Shane McCoy
Program Manager
US Army Corps of Engineers
645 G St.
Suite 100-921
Anchorage, AK 99501
Submitted via email to poaspecialprojects@usace.army.mil

Dear Mr. McCoy,

The Office of Project Management and Permitting (OPMP) has coordinated with the Alaska Departments of Natural Resources (ADNR), Environmental Conservation (ADEC), Fish and Game (ADF&G), Transportation and Public Facilities (ADOT&PF), Health and Social Services (DHSS), Labor and Workforce Development (DOL), and Commerce, Community and Economic Development (DCCED) to review the Pebble Project Preliminary Final Environmental Impact Statement (PFEIS) provided by the U.S. Army Corps of Engineers (USACE) to cooperating agencies on February 6, 2020. The following and enclosed comments constitute the State of Alaska's consolidated comments for your consideration in preparing the Final EIS (FEIS) and Record of Decision (ROD).

Dam Safety Related Comments

The Dam Safety and Construction Unit (Dam Safety) of ADNR is responsible for the "supervision" of the safety of dams in Alaska and the administration of the Alaska Dam Safety Program (ADSP). The proposed Pebble Mine project would include several large dams for managing mill tailings, contaminated mine water, and sediment from runoff that will be subject to regulation by the State.

Permitting

First paragraph under Tailings Storage Facilities and Main Water Management Pond on p.2-22 of Chapter 2.2.4.1 refers to "updated 2017" *Guidelines for Cooperation with the Alaska Dam Safety Program* (dam safety Guidelines). The dam safety Guidelines published by ADNR in 2017 are clearly marked "draft." The appropriate references for regulatory requirements are Chapter 17 in Title 46 of the Alaska Statutes (AS 46.17) and Article 3 *Dam Safety* of Chapter 93 in Title 11 of the Alaska Administrative Code (11 AAC 93). The PFEIS sites the 2017 draft in several locations. The 2017 draft revision of the dam safety Guidelines has not been formally adopted by ADNR at this point.

Note that regulatory requirements are obligatory and typically considered as a "minimum" standard of care. The Alaska dam safety regulations in 11 AAC 93.171 describe a progressive application process for a *Certificate of Approval to Construct a Dam,* intended to be flexible because of the wide variety of dams that may be subject to regulation. For example, 11 AAC 93.171(f)(1)(F) requires a proposal from a "qualified engineer" that describes the "scope of work, methodologies, levels of analysis and approach to design and construct…the dam to adequately provide for the protection of life and property…based on the proposed size and type of the dam…and the hazard potential classification." Receiving this proposal at the early stage of the project development allows agreement on key design

standards, level of detail and other important information in advance of executing the work. If standard of care for the design will be extraordinary, then such detail would be expected from the applicant to the Alaska Dam Safety Program as part of the State permitting process.

Fourth paragraph on page 2-31 states, "The ADNR permitting process includes enforcement of the ADSP guidelines." Only Section 10.4 on periodic safety inspections of the *Guidelines for Cooperation with the Alaska Dam Safety Program* (2003) have been adopted by reference in 11 AAC 93.159. The 2005 edition of the dam safety Guidelines and the 2017 "draft revision" have not been adopted in regulations or through the appropriate public process and may not be enforceable under AS 46.17 or Article 3 of 11 AAC 93. Any reference in the FEIS to "requirements" in the regulations or in the dam safety Guidelines should be reviewed for accuracy and edited as appropriate.

Conceptual Design

Section 2.2.4.1 describes the Bulk Tailings Storage Facility (TSF) consisting of a "main" tailings dam constructed by the "downstream" method for the starter dam approximately 265 feet in height which transitions to a "centerline" construction method above the starter dam to a total height of 545 feet. Another tailings dam on the south side of the TSF is constructed by the downstream method and includes a geomembrane liner on the upstream face. The main tailings dam is described as:

> [A] flow-through structure to continually enhance the seepage of water out of the tailings mass so that the tailings mass can drain, consolidate, and increase in strength over time. This feature would force the water level down deeper in the embankment and in the tailings close to the embankment, and thereby decrease the water content of the embankment fill and of the tailings near the embankment. This would increase the stability of the embankment and the TSF.

Tailings deposition would occur off the main tailings dam to form a beach. Bullet #13 on p. 4.15-8 under *Bulk TSF* in Section 4.15.3.1 states that tailings volumes are reduced "using thickening methods or additional pumping capacity." It is not clear how these provisions reduce tailings volumes, and the method for thickening tailings is not described. Paragraph 1 in Section 4.27.8.1 on p. 4.27-80 describes the grain sizes of the "bulk" tailings as "clay- to sand-sized particles (60 percent clay and silt; 40 percent fine sand)." Paragraph 3 in Section 4.27.8.1 on p.4.27.81 describes the "thick slurry of 55 percent solid rock and mineral particles and 45 percent fluid". In Section 4.15.3.1, a seepage analysis discussed on p. 4.15-10 reports sensitivity analyses of tailings properties and "coarse tailings deposited near the embankment". This is illustrated on Figure K4-15.3, and the significant segregation of tailings particles from deposition is assumed to contribute to the stability of the embankment. Thickened tailings will develop beaches and perform differently from whole slurry tailings such as 25% solids/75% water (http://www.tailings.info/disposal/thickened.htm) and may not segregate to drain more freely as assumed. The consolidation time required to gain any improvements in strength are not described. A well graded, unsegregated, low-permeability, thickened tailings deposit could result in significantly different predictions about stability and seepage performance than described for the "flow-through structure" and the apparent inconsistency with segregated tailings shown in Figure K4-15.3 should be resolved.

The fifth paragraph under *Post-liquefaction Analysis* on p.4.15-15 in Section 4.15.3.1 discusses uncertainties about beach development with thickened tailings and a number of other significant uncertainties that must be evaluated with numerical models. The preceding paragraph in Section 4.15.3.1 indicates that liquefaction of the tailings would contribute to upstream slope deformation, but

then states that the tailings would buttress the upstream slope and limit deformations, preventing the loss of freeboard. This appears to be a conflict in assumptions about tailings performance as a structural component to the "centerline" raise above the starter dam and should be clarified.

Operations

Section 2.2.4.1 *Mine Site* describes the tailings deposition plan for the pyritic tailings. The tailings are to be deposited sub-aqueously inside the perimeter of a ring of PAG waste rock adjacent to the liner system. Both the PAG waste rock and tailings are to be maintained in a submerged condition. Co-disposal of tailings and waste rock may be challenging and some discussion on precedence for this method of co-placement would be helpful to demonstrate the method is practicable.

Closure

Moving the content of the pyritic Tailings Storage Facility (TSF) to the pit at closure does not appear to be reasonable, practicable or safe for the following reasons: Return to Excerpt

1. Filling the pit with tailings precludes the opportunity to exploit additional resources known to exist at Pebble. Well-established precedence in the mining industry is to conduct significant "condemnation" drilling before constructing permanent features that would restrict access to potentially viable ore bodies. Modification of the constructed pyritic and bulk tailings storage facilities would most likely be preferred by the applicant to accommodate additional tailings rather than constructing new facilities if the mine were to expand operations beyond the stated 20-year mine life evaluated in the PFEIS. Such modifications could substantially change the predicted performance and respective risks associated with proposed structures. Fort Knox, Red Dog, Kensington, Greens Creek and Pogo Mines have made or plan significant modifications of existing TSFs to accommodate additional tailings from expanded reserves.
2. Tailings consolidate after deposition, causing water to be expelled from pore space and changes to occur in the characteristics of the material including increased density and strength. The closure plan calls for moving the tailings to the pit. This may not be practicable based on the definition from the 404(b)(1) guidelines as described in the second paragraph of Chapter 2 because this would require the material to be handled more than once which adds cost and may represent significant technological challenges. For pumping, the tailings would need to be disturbed for mixing with added water to develop a pumpable mixture. The source, quantity and disposition of that water is not discussed. Furthermore, removing the tailings with heavy equipment and trucking may not be safe because traffic and excavation on the relatively loose, saturated tailings deposit would be problematic for operations despite consolidation. The pyritic tailings will remain saturated because of the geomembrane liner.

Post-Closure

Applicant's preferred alternative described in Chapter 2.2.4 states on p.2-12, "The post-closure phase is the period of time after the closure phase when water quality would be closely monitored, and changes and adjustments to the treatment process would be made, as needed. The long-term post-closure phase is expected to last for centuries." This provision implies an adaptive management approach that is not well described and may be unpredictable based on the monitoring necessary to adjust treatment processes "as needed". Other significant uncertainties are associated with the long-term performance and disposition of the two large tailings dams and post-closure mine pit and regional hydrogeology dependent on pumping. The PFEIS should address how the post-closure water treatment, management and monitoring for centuries will be accomplished.

Return to Excerpt

Spill Risk

Section 4.27 *Spill Risk* describes a variety of spill scenarios including incidents associated with the two tailings dams and one large water management dam. Several significant-sized, but much smaller water management dams around the site were not considered; for example, the conceptual design of the seepage collection dam below the bulk tailings facility indicates the dam is 110 feet tall and 3500 feet in length, with a maximum storage capacity of 3000 acre-feet. Comments on this section are bulleted here for brevity:

- Section 4.27.8.5 *Probability of Failure* states, "determining the probability of failure of tailings dams is difficult" and goes on to cite a number of references describing failure rates in "dam-years." This concept is awkward to understand and difficult to use in a risk assessment. Annual probability of exceedance is a more straightforward approach to risk estimation. Generally, water dams are recognized with an annual probability of failure of 0.0001 (10^{-4}) and tailings dams are recognized with annual probability of failure of 0.001(10^{-3}), roughly an order of magnitude more likely to fail than water dams (Marr, 2019).
- Section 4.27.8.6 *Risk Assessment for the Proposed Embankments* states, "A Failure Modes Effects Analysis (FMEA) is a risk assessment tool commonly used for assessment of failure risk of large dams." While FMEAs are popular within the mining industry, FMEAs are not recognized in the *Federal Guidelines for Dam Safety Risk Management* (FEMA P-1025, 2015). The federal guidelines describe Potential Failure Modes Assessments (PFMA) (which are similar to FMEAs) as used for "risk identification" as part of a "risk analysis" which is used to inform a higher level "risk assessment" used for making recommendations about risk for decision making under a "risk management framework". The federal guidelines recognize "quantitative versus qualitative" nature of risk analyses, and describes risk matrices, F-N charts and societal risk. The PFMA (and by extension, the FMEA) is simply a preliminary step in a risk management program.
- In Section 4.27.8.6 *Risk Assessment for the Proposed Embankments*, spill scenarios evaluated are based on a FMEA developed by a "panel of experts in dam design, construction, and operations to assess the probability of failure and level of consequences for a dam/embankment". This is appropriately described as useful for evaluating and reinforcing designs. However, FMEA's are subjective and prone to significant cognitive bias and other forms of bias and are reportedly unreliable for formal risk assessment (Oboni, et.al. 2012; Oboni, et.al. 2013; Thomas, et.al., 2014). Using the FMEA "to assess the likelihood of a spill and the severity of potential environmental impacts" as described in paragraph 3 is a novel application of the FMEA process. Subjectively categorizing the likelihood of failure modes as "relatively low", "extremely low", "extremely unlikely" or other terms, then using these assignments for extrapolating probabilities for selecting failure scenarios for evaluating potential environmental impacts or making decisions should be conducted with extreme caution and include clearly stated caveats. These comments are similarly applicable to Section 4.27.9.5 with respect to the main water management pond. However, note that in Section 4.27.9.4 *Probability of Release/Spill Frequency and Volume* this feature is recognized as unprecedented in size, adding additional uncertainty to its performance because of the proposed geomembrane liner.

- The fourth paragraph of Section 4.27.8.6 states, "It should be noted that the potential failure modes analyzed did not reflect any specific weakness in the design, but were developed for estimating potential release volumes to analyze impacts of a hypothetical release…The probability of a full breach of the bulk or pyritic TSF tailings embankments was assessed to be extremely low (i.e., worst-case)." Dam Safety agrees that a full breach of a large well-designed and properly operated and monitored tailings dam is not likely to occur. In the paper *Tailings Dam Failures: A Review of the Last One Hundred Years*, the authors state, "Upon dam breakage, the released tailings generally amount to about one-fifth of those contained within the facilities." (Azam and Li, 2010). However, in *Floods from tailings dam failures* (Rico, et. al., 2007), the authors evaluate discharges from tailings dam failures and provide regression equations for estimating discharges from incidents, and state, "The diversity of tailings dam characteristics…make any universal prediction assessing dam failure impacts very speculative". In the unlikely event of a catastrophic water dam failure, release of the full contents exclusive of tailings would be expected.
- Section 4.27.8.8. *Mitigation* lists nine bullets, at least six which specifically reference or imply compliance with ADNR dam safety statutes, regulations or guidelines which are suggested as risk mitigation measures for the dams for the Bulk and Pyritic TSFs. Section 4.27.9.7 *Mitigation* lists seven bullets, at least four which specifically reference or imply compliance with ADNR dam safety statutes, regulations and guidelines which are suggested as risk mitigation measures for the large dam for the main water management pond. Compliance with regulatory requirements is widely recognized as the minimum standard of care (Fourie, 2009). Mitigation measures that rely on proven engineering controls are most appropriate to reduce risk, rather than relying heavily on compliance with state regulatory programs.
- Both Section 4.27.8.8 and Section 4.27.9.7 include a bullet implying that dam embankments would be designed and constructed with a factor of safety value of "1.9 to 2.0." As seen in Figure 1 to this memorandum, increasing the factor of safety is not as effective in reducing probability of failure as raising the standard of care for the design, construction, and operation of a dam (Silva, et.al., 2008). Increasing the factor of safety for embankments may not be an effective mitigation for risk.

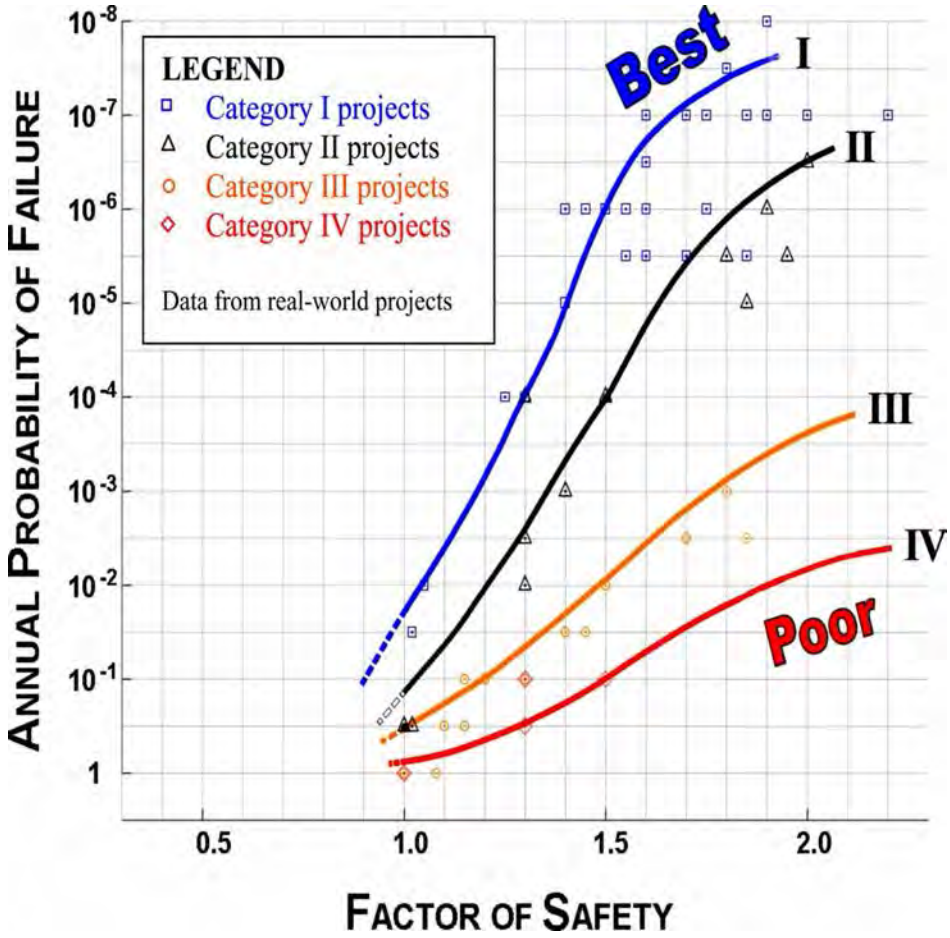

Figure 1 From Silva, et.al. 2018

- In the Sixth Victor De Mello lecture, *Geotechnical Risk, Regulation, and Public Policy* respected mining engineer and professor emeritus at University of British Columbia, Dr. Norbert Morgenstern states:

> The recent failures of major dams in technically advanced regions of the world, operated by mature mining organizations and designed by recognized consulting engineers, has created a crisis in terms of a loss of confidence and trust associated with the design, construction, operation, and closure of tailings storage facilities. (Morgenstern, 2018)

Figure 2 in this memorandum from Dr. Morgenstern's paper shows the significance of regulatory compliance, referred to there as "codes and standards", "engineering judgment" and "risk-based analysis" in a decision-making process.

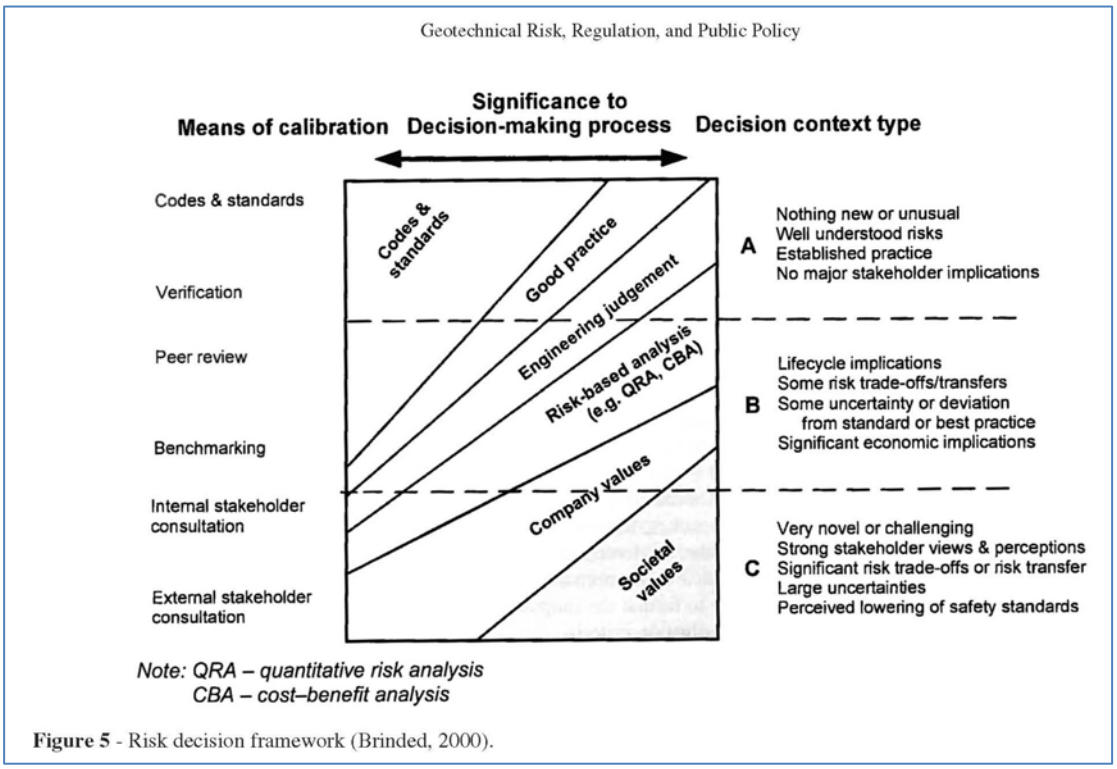

Figure 2 From Morgenstern, 2018

- Figure 3 to this memorandum is a current rendition of a widely recognized F-N chart annotated by the highly respected geotechnical engineer and risk expert, Dr. W. Allen Marr for a presentation to the National Academy of Science, Engineering and Medicine on September 5, 2019. Dr. Marr uses the popularly recognized F-N chart for tolerable risk of various industries and super-imposes the currently accepted "average" annual probability of tailings dam failures of 10^{-3} in a wide, blue dashed-line. In the respective lecture, Dr. Marr notes that half of the tailings dams contributing to the statistic are above the line while half are below it. Figure 4 to this memorandum presents a subsequent slide from Dr. Marr's presentation, popularly recognized, showing the three basic tailings dam construction methods. With upstream tailings dams and downstream tailings dams widely recognized as the highest risk and lowest risk structures, respectively, the centerline construction method similar to the Bulk TSF represents the average probability failure at best, given the current level of detail in the design. For completeness, Dam Safety recommends that the EIS evaluate potential impacts from the failure of the centerline dam during operations for a 1/1000 annual probability of failure with a release volume roughly equivalent to 20% of the stored volume at the time (Azam and Li, 2010), respective published regression equations if appropriate (Rico, et. al., 2007 or other reference), or other rationalized estimates of stage of operation and release volume. Note that uncertainties about tailings properties previously addressed in this memorandum in comments on the design, as well as actual performance during operations with respect to removing supernatant water from the Bulk TSF may significantly affect the estimates of release volume.

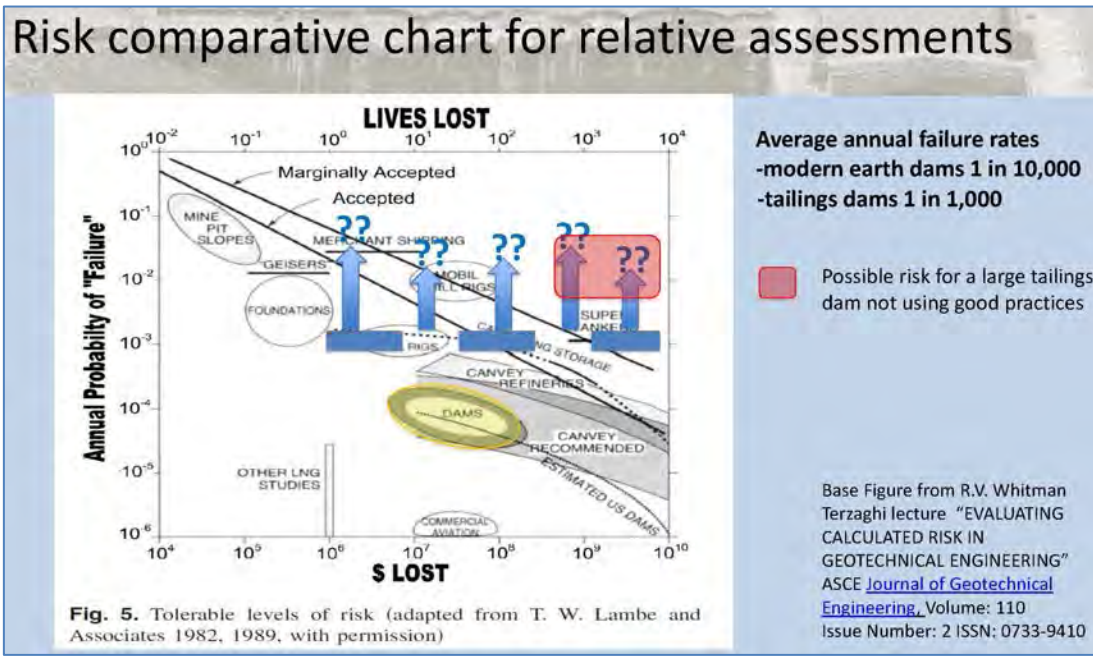

Figure 3 From Marr, 2019

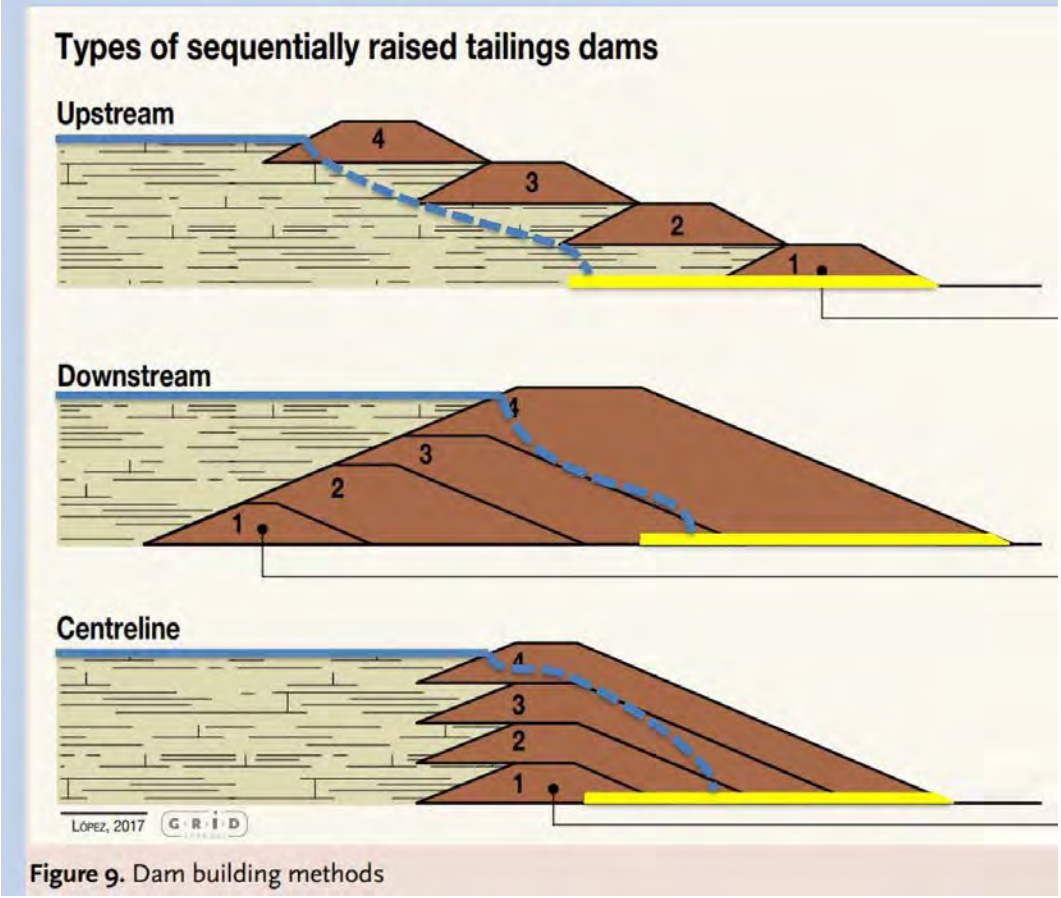

Figure 4 From Marr, 2019

Summary and Conclusions

ADNR Dam Safety provided comments on permitting, design, operation, closure, post-closure and spill risk as described in the PFEIS for the proposed Pebble Mine project. ADNR Dam Safety believes that the reliance on the subjective FMEA process within the Pebble PFEIS to estimate failure scenarios of the very large, tailings dams and the large, main water management pond dam, based on a marginally developed, conceptual design, and the exclusion of other risks including the other relatively large, water management dams, does not represent a thorough assessment of risk from potential failure modes and potential impacts. ADNR Dam Safety recommends that a limited failure of the centerline dam embankment of the Bulk TSF at some point during operations is also considered and cautions that an FMEA is not a complete risk assessment. While dam safety programs, as well as modern engineering, modern mining practices, and modern environmental regulations, are known for reducing risk from mines and dams (Cobb, 2018; Cobb, 2019), it is not clear that the PFEIS has considered risks, impacts, or mitigation of changes in operations or failures in the closure and post-closure periods and the respective obligations of the applicant.

Return to Excerpt

Return to Excerpt

Thank you for the opportunity to review the PFEIS and engage throughout the federal environmental review process for the Pebble Project as a cooperating agency. Please contact me if you have any questions regarding the above or enclosed comments.

Sincerely,

Kyle Moselle
Associate Director

Enclosure:
Pebble_PFEIS_SOA_Comments_Enclosure-1 (MS Excel)
Pebble_PFEIS_SOA_DEC_Response_Matrix_Encloure-2 (MS Excel)

Cc:
State Review Team

References

Azam, S. and Q. Li, (2010) *Tailings Dam Failures: A Review of the Last One Hundred Years,* Waste GeoTechnics

Cobb, Charles F. (2018) *Update on tailings dam safety and regulation in the United States*, Proceeding of Tailings & Mine Waste 2018, Colorado State University

Cobb, Charles F. (2019) *Progress in Modern Tailings Dam Safety and Regulation in the United States*, The Journal of Dam Safety, Vol. 16, Issue 2, Association of State Dam Safety Officials

FEMA (2015) *Federal Guidelines for Dam Safety Risk Management*, P-1025, Federal Emergency Management Agency

Fourie, A. B. (2009) *Future tailings management strategies: High time we took the high road*, Proceedings of Tailings & Mine Waste 2008, CRC Press/Balkema

Marr, W. Allen (2019) *Why mine waste impoundments experience stability failures*, Committee on Geological and Geotechnical Engineering, Board of Earth Sciences and Resources, National Academies of Science, Engineering and Medicine

Morgenstern, Norbert R. (2018) *Geotechnical Risk, Regulation, and Public Policy*; 6th Victor de Mello Lecture; Soil and Rocks, Vol. 41 N.2

Oboni, C., and F. Oboni, F. (2012) *Is it true that PIGs Fly when Evaluating Risks of Tailings Management Systems?*, Proceeding of Tailings & Mine Waste 2012, Information Technology Creative Media, University of British Columbia

Oboni, F., C. Oboni and S. Zabolotniuk, (2013) *Can We Stop Misrepresenting Reality to the Public?,* Canadian Institute of Mining, Toronto https://www.riskope.com/wp-content/uploads/Can-We-Stop-Misrepresenting-Reality-to-the-Public.pdf

Thomas, P., R. B. Bratvold and J. E. Bickel (2014) *The Risk of Using Risk Matrices*, SPE, Economics & Management 6(2): 56-66
https://www.researchgate.net/publication/266666768_The_Risk_of_Using_Risk_Matrices

Rico, M., G. Benito and A. Diez-Herrero (2007) *Floods from tailings dam failures*, Journal of Hazardous Materials

Silva, Francisco, T. W. Lambe, and W. A. Marr. (2008) *Probability and Risk of Slope Failure*, Journal of Geotechnical and Geoenvironmental Engineering, American Society of Civil Engineers.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Executive summary	3.1.2.3 Subsistence	35	Overall, impacts to fish and wildlife would not be expected to impact harvest levels, because no population-level decrease in resources would be anticipated. There would be some site-specific habitat fragmentation from project facilities, causing behavioral disturbance to terrestrial wildlife and birds, and localized changes in distribution. This may result in having to travel further to harvest species, such as caribou, that are anticipated to avoid project facilities. Subsistence search and harvest areas directly in the footprint of the project components (mine site, ferry terminals, port, and transportation corridor) would no longer be available, and some wildlife may shift away from areas disturbed by the project. Although no population-level impacts to terrestrial species are anticipated, species range and use areas may shift to areas further away from disturbed areas.	Displacement of species from project impacts may impact harvest levels of sport and subsistence hunting alike, even if a no population level impacts conclusion is supported. Harvest occurs quite often in specific areas where these species occur or congregate. Elimination of a species habitat or redistribution of a species to other areas may result in changes to harvest opportunity.
Executive Summary	Section 3.5.2 Diesel Spills	98-99	PFEIS indicates that in Marine Diesel Spill scenario 2, diesel spilled into marine water would float on the surface, and naturally evaporate and disperse within 2 to 3 weeks with no recovery efforts.	"Marine diesel" used in vessels is often a heavier intermediate fuel oil that persists longer when spilled vs vehicle diesel, a lighter, refined petroleum product. Clarify which oil type is referenced and edit scenario accordingly.
Executive Summary	Section 3.5.2 Diesel Spills	98-99	In the diesel oil spill scenario it says: Impacts to marine mammals would be of low likelihood and temporary; individuals or groups could potentially be injured or die, but measurable impacts to the overall population are unlikely. The next paragraph also mentions "Potential impacts from a marine diesel spill to Threatened and Endangered Species (TES) could be of high magnitude, depending on the species and the fate of the spilled fuel." Several of these ESA species are marine mammals and could see population-level effects.	The conclusion that impacts to marine mammals would be of low likelihood and temporary is inconsistent with information provided within the PFEIS. There are numerous pinniped haul outs in the area described which could be impacted by a spill. These impacts would be largely dependent on the species and numbers present, amount and fate of the spilled fuel, and other factors. Stating impacts would be low and temporary and in the same line stating individuals or groups could be injured or die is contradictory. Recommend conclusions be reanalyzed and section text revised including basis for conclusion that impacts to marine mammals would be of low likelihood and temporary. Return to Excerpt
Executive Summary	Section 3.5.3 Natural Gas Release	99	The PFEIS summarizes impacts from a natural gas leak would be limited and no health or safety impacts would be expected.	The PFEIS should address the potential environmental impact from natural gas leaks more completely. Environmental Impacts of natural gas leaks are largely unknown and monitoring or repairs are challenging in Cook Inlet due to ice coverage. As seen in previously these leaks can go on for extended periods until repairs can be made. NOAA's Pacific Marine Environmental Lab lists 3 potential impacts exist during a natural gas leak in Cook Inlet in 2017 (based on Patin 1999) 1) fish exposure to methane 2)hypoxic zone/depleted oxygen levels in the water 3) acid water causing weakening of shells of some species. Reference: Patin, S. A. 1999. Environmental impact of the offshore oil and gas industry. xi, 425 p. EcoMonitor Pub., East Northport, N.Y.
Executive Summary	Section 3.5.4 Copper-Gold Concentrate Spills	99	Hypothetical situations from a Copper-Gold concentrate spills are described in two scenarios	Additional information should be included to evaluate the environmental impacts to terrestrial and marine mammals from secondary exposure (if prey species impacted by the spill are ingested, such as small mammals ingested by raptors, marine mammals eating fish or benthic organisms, birds ingesting exposed insects, worms, etc.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Executive Summary	Section 3.5.6 Tailings Releases	103	Biological Impacts of Tailings Release Scenarios describe impacts to fish and birds and wildlife that reply on fish as a food source.	The PFEIS should expand on impacts to wildlife including birds directly exposed to the elevated metals. The PFEIS describes impacts as "moderate" - –Additional information should be included to evaluate impacts/mortality that could occur to wildlife drinking or swimming in the elevate TSS and metals concentrations in the water.
Executive Summary	Section 3.5.6 Tailings Releases	103	Biological Impacts of Tailings Release Scenarios describe impacts to fish and birds and wildlife that rely on fish as a food source. The PFEIS states: Most of the fine tailings particles would be transported downstream, causing elevated TSS in exceedance of WQC for approximately 230 miles downstream as far as the Nushagak River Estuary, where the river feeds into Nushagak Bay, part of greater Bristol Bay. Elevated TSS would likely last up to a week from the bulk tailings release, and several weeks from the pyritic tailings release. In the Biological Impacts section the PFEIS state "There could be moderate impacts to wildlife and birds from the elevated metals". However the PFEIS fails to consider that marine mammals use these downstream areas as habitat; and does not consider Bristol Bay beluga whales inhabiting the analysis area.	The PFEIS should expand on impacts to marine mammals in Nushagak Bay and Nushagak River if using this elevated metal scenario. Belugas are known to move up rivers in Bristol Bay during April to consume rainbow smelt and out-migrating salmon (Citta et al. 2016). These belugas are not federally listed however are protected under the MMPA. Reference: Citta, J. J., L. T. Quakenbush, K. J. Frost, L. Lowry, R. C. Hobbs, and H. Aderman. 2016. Movements of beluga whales (Delphinapterus leucas) in Bristol Bay, Alaska. Marine Mammal Science 32(4):1272-1298. https://www.doi.org/10.1111/mms.12337
Chapter 3 Affected Environment, Chapter 4 Environmental Consequences Appendix D-Comment Analysis Report	ALL	ALL	Bristol Bay Beluga whales have not been accounted for in anywhere in the analysis. These whales are not federally listed and therefore not discussed in endangered species sections; but they are likewise not covered in the Wildlife or Marine mammal sections either. Impact analysis appears not to have been done on them. These beluga whales occur throughout Nushagak Bay including as far as 18 miles up the Nushagak River. They also occur in the lower Kvichak River and more than 15 miles up the Naknek River.	The PFEIS should include analysis of Bristol Bay beluga whales in is assessment of the affected environment and potential impacts.
Chapter 3 Affected Environment, Figure 3.25 Whale Occurrences	Figure 3.25-2, Section 3.25 TES, 3.25.3.1 Cook Inlet Beluga Whale	Figure 3.25-2; 3.25-6; Page 3.25-23	Occurrences of the Cook Inlet beluga whale in lower Cook Inlet	Include the observation of 4 Cook Inlet beluga whales (CIBW) seen in Kachemak Bay July 1, 2018. Additionally, belugas were recorded on acoustic monitors on 1/20/2019 in Port Graham. These updates are important as it shows the CIBW still occurs in the lower inlet. Reference: Pers. Comm. Verena Gill (NOAA Fisheries) October 2018; Cook Inlet Beluga Whale Photo ID Project. Pers. Comm. Manolo Castellote (NOAA Fisheries) February 24, 2020.
Chapter 3 Affected Environment, Figure 3.25-3 Steller Sea Lion Occurrences	Figure 3.25-3	Figure 3.25-3	Steller sea lion occurrences in the Analysis Area	The map should indicate the survey source in the title as these identified Augustine Island Steller sea lion (SSL) haul outs are not currently included in the NMFS recognized SSL haul out database. Reference: Fritz, Lowell; Sweeney, Kathryn; Towell, Rod; Gelatt, Tom (2015). Steller sea lion haul out and rookery locations in the United States for 2016-05-14 (NCEI Accession 0129877). [indicate subset used]. NOAA National Centers for Environmental Information. Dataset. https://doi.org/10.7289/v58c9t7v. Accessed [2/20/20].

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 3 Affected Environment, Figure 3.25-3 Steller Sea Lion Occurrences	Figure 3.25-3	Figure 3.25-3	Steller sea lion occurrences in the Analysis Area	Use existing datasets to show Steller sea lion (SSL) occurrences in the Analysis Area; the numbers depicted in the map are low. SSLs are recorded incidentally to Cook Inlet beluga aerial surveys (1993-2012, 2014, 2016). See https://www.fisheries.noaa.gov/alaska/endangered-species-conservation/research-reports-and-publications-cook-inlet-beluga-whales
Chapter 3 Affected Environment, Figures 3.25	Figures 3.25-2. 3.25-3, 3.25-5, 3.25-6	Various	The PFEIS only include the year of surveys on one figure (Figure 3.25-4, Northern Sea Otter Occurrences)	Consider adding the year and survey basis (i.e. ABR 2019) on figure title - bottom right of document as seen in figure 3.25-4) Reviewers should be made aware how limited or detailed the occurrence data includes. It is difficult to determine as the source PLP 2019-RF1153 could not be located in the review material or online at 2.20.2020
Chapter 3 Affected Environment	Section 3.25.1.1 Cook Inlet Beluga Whale	3.25-3	The PFEIS states annual abundance surveys for the Cook Inlet beluga whale were conducted every June and August since 1999	Correct text: aerial surveys were conduced in June, July, or both from 1993-2020, after which biennial surveys began in 2014. Reference: Shelden, K., R. Hobbs, C. L. Sims, L. Vate Brattström, J. Mocklin, C. Boyd, and B. Mahoney. 2017. Aerial Surveys, Abundance, and Distribution of Beluga Whales (Delphinapterus leucas) in Cook Inlet, Alaska, June 2016
Chapter 3 Affected Environment	Section 3.25.1.1 Cook Inlet Beluga Whale	3.25-3	The PFEIS state the Cook Inlet beluga whale population has continued to decline at a rate of approximately 0.4 percent per year.	Correct to -0.5% per year. Reference: Shelden, K., R. Hobbs, C. L. Sims, L. Vate Brattström, J. Mocklin, C. Boyd, and B. Mahoney. 2017. Aerial Surveys, Abundance, and Distribution of Beluga Whales (Delphinapterus leucas) in Cook Inlet, Alaska, June 2016
Chapter 3 Affected Environment	Section 3.25.1.1 Cook Inlet Beluga Whale	3.25-3	Include new (January 2020) NOAA abundance estimate for the endangered Cook Inlet beluga whale	The estimated population size is between 250 and 317, with a median estimate of 279. The population is estimated to be smaller and declining more quickly than previously thought. Over the most recent 10-year time period (2008-2018), the estimated trend in abundance is approximately -2.3%/year Reference: https://www.fisheries.noaa.gov/feature-story/noaa-releases-new-abundance-estimate-endangered-cook-inlet-beluga-whales
Chapter 3 Affected Environment	Section 3.25.1.2 Humpback Whale	3.25-8	PFEIS indicates humpback whale spend the winter mating and calving in the subtropical and tropical waters of the Northern and Southern hemispheres.	While most humpback whales migrate, they can be found in Alaska year-round. Reference: ESA Section 7 Biological Opinion NMFS Consultation Number AKR-2018-9719 and https://www.fisheries.noaa.gov/feature-story/noaa-releases-new-abundance-estimate-endangered-cook-inlet-beluga-whales
Chapter 3 Affected Environment	Section 3.25.1.4 Steller sea lion; 3.25.3.4 Steller sea lion	3.25-11; 3.25-24	The PFEIS indicates Shaw Island is a major haul out.	It is more accurate to say Shaw island is a haulout site recognized by NMFS and not necessarily a "major" site.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 3 Affected Environment	Figure 3.25-3 Steller sea lion analysis area; 3.25.1.4 Steller sea lion habitat use and distribution; 3.25.3.4 Steller sea lion	Figure 3.25-3; Pages 3.25-12 and 3.25-24	The PFEIS describes Steller sea lions in the analysis area near shore	Tag data collected during October 2019 (ADFG) indicate Steller sea lion use of the eastern section of the analysis area (off shore, near the proposed pipeline). See Habitat Use of Adult Female Steller Sea Lions in the Endangered Western Distinct Population Segment, 2019-2020 https://portal.atn.ioos.us/#map
Chapter 3 Affected Environment	3.25.1.5 Northern Sea Otter	Page 3.25-15	A sea otter haulout survey is described in the project area.While sea otters may haul-out occasionally on land to rest, and may show patterns in hauling out in the same location, they can spend their entire lives in the water and do not have established haul-outs as do pinniped species. This information should be provided to readers so they can better understand the results of the sea otter survey, specifically that lack of haulouts do not necessarily mean lack of sea otters using the area. Reference: http://www.adfg.alaska.gov/index.cfm?adfg=seaotter.printerfriendly	While sea otters may show haul-out patterns, lack of sea otters on shore is not necessarily an indicator of abundance. See Esslinger et al. 2015 for conducting overwater surveys. Esslinger, G.G., Esler, D., Howlin, S., and Starcevich, L.A., 2015, Monitoring population status of sea otters (Enhydra lutris) in Glacier Bay National Park and Preserve, Alaska—Options and considerations: U.S. Geological Survey Open-File Report 2015-1119, 42 p., http://dx.doi.org/10.3133/ofr20151119.
Chapter 4 Environmental Consequences	4.23.4.3 Marine Mammals	4.23-37	The PFEIS indicates noise sources are previously described in Section 3.23, Wildlife Values, for non-federally listed marine mammals	Noise sources are not described in Section 3.23; noise is only mentioned once and in section 3.23.5 Climate Change (page 3.23-68).
Chapter 4 Environmental Consequences	4.23.4.3 Marine Mammals	4.23-39	Reactions of marine mammals of low-flying aircraft is explained.	The PFEIS should include in this explanation that the response of hauled-out animals to low flying aircraft on land (seals, sea lions) is to enter the water.
Chapter 4 Environmental Consequences	4.23.4.3 Marine Mammals	4.23-40	Elevation to avoid disturbance to marine mammals while flying	The unit is missing (feet).

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4 Environmental Consequences	4.23.4.3 Marine Mammals	4.23-41	The PFEIS states the onshore activities near the Amakdedori port might displace the use of haulout sites by harbor seals. It states these disturbances would be limited to the immediate vicinity of the facilities and short-term in nature, and not be expected to affect local populations of harbor seals, because the animals are highly mobile and feed near river mouths.	Provide reference for this analysis and explain reasoning how harbor seal feeding mobility near river mouths will prohibit abandonment of local haulout sites due to Amakdedori port onshore activities. Montgomery et al. 2007 concludes harbor seals in Cook Inlet establish haulouts away from human activity. Anthropogenic disturbance can lead seals to avoid or completely abandon haul-out areas (Sullivan 1980, da Silva & Terhune 1988). ADF&G observations of harbor seals at remote haulout sites locations indicate remote populations are more sensitive to anthropogenic disturbances. Seals on Tugidak Island, AK, have left the beach when a small, fixed-wing airplane passed over at 2,000 feet while in other areas they remained undisturbed when the aircraft was 1,000 feet or less in altitude (Pitcher and Calkins 1979). Helicopters create even more of a disturbance. References: da Silva J, Terhune JM (1988) Harbor seal grouping as an anti-predator strategy. Anim Behav 36:1309–1316 Montgomery, R. A., J. M. V. Hoef, and P. L. Boveng. 2007. Spatial modeling of haul-out site use by harbor seals in Cook Inlet, Alaska. Marine Ecology Progress Series 341:257-264. Tugidak Island Critical Habitat Area Management Plan June 1995 - Pitcher and D.G. Calkins. 1979. Biology of the harbor seal (Phoca vitulina richardsi) in the Gulf of Alaska. Outer Continental Shelf Environ. Assess. Prog. Final Rep. 19: (1983): 231-310. National Oceanographic and Atmospheric Administration, U.S. Dept. of Commerce Sullivan RM (1980) Seasonal occurrence and haul-out use in pinnipeds along Humboldt County, California. J Mamm 61:754–760
Chapter 4 Environmental Consequences	4.23.8.2 Reasonably Foreseeable Future Actions	Page 4.23-56	The PFEIS indicates noise generated during construction and operations may temporarily disturb marine mammals , causing them to leave or avoid the area.	This statement does not recognize the science that is known about noise and marine mammals. Loud noises can cause temporary or permanent hearing loss, can mask other sounds, and can disturb animals in various ways (Southall 2019). Suggest stating during the USFWS and NMFS consultations the number of animals allowed to be "taken" under permit will be determined. Southall, B., J. Finneran, C. Reichmuth, P. Nachtigall, D. Ketten, A. Bowles, W. Ellison, D. Nowacek, and P. Tyack. 2019. Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals 45:125-232. 10.1578/am.45.2.2019.125

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4 Environmental Consequences	ALL	ALL	The information provided in Chapters 3& 4 of the PFEIS is not adequately summarized in this table. The Summary of Project contribution to Cumulative Effects states: Overall, the contribution of the Applicant's Preferred Alternative to cumulative effects on wildlife populations, when taking into account other past, present, and RFFAs, ~~would be in the range of their natural population variability.~~	The underlined phrase is used frequently throughout the PFEIS in conclusionary statements regarding the impacts of the project. Usually without any actual data on numbers of individuals effected compared to existing populations. It is often misleading given documentation of significant impacts throughout the document. The hypothesized losses from the proposed project would not normally be considered within natural variability. Particularly in this previously undeveloped area, with 31,892 acres of lost habitat, and the potential for terrestrial and marine wildlife and anadromous fish losses. **Return to Excerpt** Delete or reword this conclusionary statement throughout document and/or provide a more accurate representation of impacts to area resources in these conclusionary summaries. Or provide basis comparison of predicted losses and "natural population variability" .
3.1.6 Incomplete and Unavailable Information	Table 3.1-2: Data Gaps Screening	3.1-8	Discussion regarding data gaps indicates that the only data gap subsistence information. The ADF&G has previously identified a number of data gaps exists for brown bear denning habitat, movement and use areas, and foraging areas; especially in the high brown bear density, southern access route and Amakdedori Port areas. ADF&G has provided comments on a number of occasions that there are multiple data needs in regards to brown bear movements, brown bear denning and foraging areas. The literature based analysis of the APA southern access route clearly shows that potential impacts are likely. However, the magnitude and extent of these impacts is largely unknown because these data gaps have not been investigated. Additionally, these data are needed in order to determine appropriate siting and design of facilities and appropriate mitigation measures. **Return to Excerpt**	Analysis on brown bear habitat use and movements in relation to the access road and port site and the McNeil River State Game Refuge and McNeil River State Game Sanctuary should be included in gap analysis and this information provided in order to determine the projects impacts on brown bears, brown bear movements, habitat fragmentation and brown bear viewing opportunities in the area. It is potential that these impacts extend well south of the road into the McNeil River State Game Sanctuary.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4: Environmental Consequences	Sect. 4.23.2 Table 4.23-2 4.23.4.2 Terrestrial Wildlife - Bear	4.23-4 thru 4.23-11 4.23-28 thru 29	The PFEIS analysis of traffic levels recognizes that there will be impacts to bear behavior from vehicle traffic at the proposed 35 round trips per day (70 truck passings/ day). This is based on a simple division of 70 truck passings over a 24 hour period to get an average of 1 truck every 21 minutes. It further recognizes that this 70 vehicles / day is already in the upper end of moderate avoidance in the case of bear avoidance and will result in avoidance of the road and surrounding area which will impact denning, bear movements through the area, foraging, etc. However, the PFEIS also documents that there will be additional small vehicle traffic from mine construction and operations as well as local and business traffic that will be permitted. The PFEIS does not include these additional vehicles in the analysis of impacts to bear or other wildlife disturbance and behavior. It is most likely that these additional vehicles will push the level of disturbance and avoidance up into the strongly avoided level. The analysis also does not consider the level of disturbance from the proposed large double trailered trucks.	As noted in literature and the PFEIS there is potential for significant behavioral and habitat fragmentation impacts to bear, moose and caribou based just on the proposed 35 round trips trucks per day. Yet the analysis does not include the additional mine related and local vehicular trips that are proposed for daily use. The analysis of behavioral, mortality and other vehicle traffic related impacts should include impacts from this additional vehicle traffic in addition to the concentrate trucks, as well as, incorporating an assessment of the vehicle size, speed and noise level.
Chapter 4: Environmental Consequences	4.23.4.2 Terrestrial Wildlife - Behavioral Avoidance - Bear	4.23-29	The PFEIS underestimates the magnitude and extent of impacts to brown bear from the Amakdedori Port and southern access road. Because the area has a high density of bears (per Section 3.23, Wildlife Values), some individuals would experience disturbance. However, the overall population of bears in the analysis area are not expected to be adversely impacted by disturbances to a measurable extent, given the mobility of the species and vast extent of available habitat. The PFEIS diminishes the significance of these impacts by concluding that "...**the overall population of bears in the analysis area are not expected to be adversely impacted by disturbances to a measurable extent, given the mobility of the species and vast extent of available habitat."**	The PFEIS concludes that there is a high density of brown bear using the area for movement, foraging, and important denning, and that there could be potential impacts. The PFEIS shows that brown bear use of the transport corridor is high, that there is a strong behavioral response by brown bear to road traffic, that proposed traffic levels exceed these levels, and that there would be potential behavioral impacts resulting in the loss of these habitats. The potential impacts could be permanent, long term and include an even larger avoidance buffer around the road corridor. Brown bears may be using specific areas for specific purposes such as denning, foraging, and movement corridors. The PFEIS concludes that the overall impact from disturbance is not expected to be of a measurable extent does not appear to be supported by other information in the PFEIS; and without first having studied and determined where these important use areas are in the project area, the extent to which they are available in the surrounding habitat and how the project would impact these habitats and bears. The ADF&G believes impacts to bears, and bear related recreation (hunting and viewing), could be significant, given the information at hand. The PFEIS should accurately depict the anticipated magnitude, extent and permanence of this disturbance loss.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4: Environmental Consequences	4.23.4.2 Terrestrial Wildlife - Behavioral Avoidance - Caribou	4.23-26	Multiple factors affect the ability of caribou to successfully cross a road, including time of year, effects of mosquitoes and other insect harassment, and group size. Therefore, although the project transportation corridor would be primarily east of the main use area of the Mulchatna caribou herd, the anticipated level of truck traffic would be one truck passing in either direction every 21 minutes during a time that coincides with post-calving use of the mine site.	The underlined sentence appears to have been two unrelated sentences with something deleted in the middle to make one sentence. Additionally, the therefore at the beginning seems out of place. It is not clear what is trying to be portrayed here. Revise sentence to clearly state idea or information being portrayed.
Chapter 4: Environmental Consequences	4.23.4.2 Terrestrial Wildlife - Habitat Changes - Caribou	4.23-35	"In summary, the magnitude of potential habitat loss (including both direct and indirect) could reach 291,313 acres, depending on the extent of habitat avoidance. This represents around 1 percent of their current occupied range based on the limited radio-collared data. There may be additional acreage of avoidance around the mine access road, ferry terminals, and port. ~~However, this habitat loss is not currently in the center of the Mulchatna caribou herd annual range.~~ The duration would last for the life of the project, and potentially longer, depending on the level of human activity post-closure." Loss of habitat cannot be limited to "current" range. It needs to include historic range that these caribou have used and may use again in future. That is the nature of rangeland, species move from one area to another as resources are depleted and return when resources are available again. Analysis also needs to include acreages for losses from other the project components. While fewer caribou inhabit the access road, ferry terminals, and port; they do use these areas and as the PFEIS documents state, there would be a loss of habitat both directly and indirectly through disturbance. Further these losses are for the life of the project or longer depending on post closure use of components and ability to restore areas to useable rangeland. Even using a conservative estimate of a 4 mile buffer (half that of the mine data) either side of a 70 mile access corridor yields in excess of an additional 179,000 acres of lost rangeland. Together with mine impacts this lost caribou rangeland is likely in excess of 500,000 acres.	Add direct loss acreages, and disturbance buffer acreages for other mine components to calculations of lost habitat. The underlined sentence should also be deleted as it is not pertinent to the loss of these caribou rangelands from the project. Unless proven methods can be provided for restoration of lichens and other forage in caribou rangeland then direct impacts should be considered permanent. And given the probability that the access road corridor will remain after closure the indirect habitat losses would also likely be considered permanent.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4: Environmental Consequences	4.23.4.2 Terrestrial Wildlife - Habitat Changes - Bear	4.23-35	"There would be additional habitat around mine components that would be indirectly removed by avoidance due to behavioral disturbance. Avoidance areas may include preferred denning habitat (such as near Amakdedori port), and other locations of seasonal food sources. "	Add movement corridors and habitat fragmentation to list of potentially avoided or changed areas.
Chapter 4: Environmental Consequences	4.23.4.2 Terrestrial Wildlife - Habitat Changes - Bear	4.23-36	"In terms of impact magnitude and duration, **a large portion of the project would be restored following closure of the mine; therefore, the actual amount of permanent habitat loss would be less**." The statement does not speak to the actual magnitude and duration of the impacts, it refers to some portion being less permanent due to restoration. Additionally, throughout the PFEIS it clearly indicates that the access road and a portion of the port would likely remain, possibly in perpetuity. As would the direct impacts and some level of indirect impacts.	Revise statement to accurately reflect the magnitude and duration of the project impacts on brown bear habitat, including indirect habitat losses due to disturbance.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4: Environmental Consequences	4.23.4.2 Terrestrial Wildlife - Habitat Changes - Bear	4.23-36	"In summary, the magnitude of habitat loss may exceed 13,000 acres (9,602 acres of direct impacts plus 3,680 acres of habitat that would be avoided along the port access road). ... The indirect habitat loss through avoidance may include loss of foraging and denning locations, and may result in increased interspecific competition. The duration would last for the life of the project and longer., ~~because~~ the pit lake would represent a permanent loss of habitat. The extent would include all of the mine components, and in particular, the port access road.	Add movement corridors and habitat fragmentation to list of habitat lost through avoidance. The underlined text is out of place/needs revision. The duration of all components would be life of project or longer due to potential long term retention of the road and port as well as other features. The pit lake would represent a permanent loss of habitat.
Chapter 4: Environmental Consequences	4.23.5 Alt 1 - Terrestrial Wildlife - injury and mortality	4.23-37	"If Alternative 1 is chosen, permitted, and constructed, impacts would be expected to occur, especially with wildlife being killed along highways, although such injury and mortality may occur infrequently."	Similar designs, speed and WIP measures would be put in place along this alternative as the other alternatives so it is unclear why this is called out in this way rather than treating it similarly to text for the other alternatives. Additionally, it is unclear what is meant by the term "highways", as none are planned.
Chapter 4: Environmental Consequences	4.23.5 Alt 1 - Terrestrial Wildlife - injury and mortality Table 4.23-2 All other references to acreage.	4.23-37 4.23-5 ALL	"The magnitude and extent of impacts would be the loss of 9,602 acres, which includes all mine components."	This text appears in the Alternative 1 habitat changes discussion. The figure 9,602 is also the acreage presented throughout much of the 4.23 text for the Applicants Preferred Alternative (APA). Presumably the acreage would be different for Alternative 1. Additionally, the total acreage impacted for the APA in Table 4.23-2 is noted as 9,612 but throughout the text of 4.23 the figure of 9,602 is quoted. Check and correct acreages in all sections.
Chapter 4: Environmental Consequences	Table 4.23-4	4.23-60	"Other Mineral Exploration Projects" "Some RFFAs associated with mineral exploration activities (e.g., Pebble South, Big Chunk North, Big Chunk South, Fog Lake, and Groundhog) could have some limited wildlife impacts—primarily, disturbance from aircraft and drilling—and localized effects on water quality in watersheds common to the project (e.g., drill pads, camps); however, they would be seasonally sporadic, temporary, and localized, based on remoteness." "Overall, the contribution of the Applicant's Preferred Alternative to cumulative effects on wildlife populations, when taking into account other past, present, and RFFAs, would be in the range of their natural population variability."	It is unclear why RFFA analysis was apparently limited to "Exploration" for mineral extraction projects given the potential for vast expansion in surrounding claims. The proposed project would contribute significantly to RFFA for "development and operations" as well as exploration. In the same table, Oil and Gas Exploration and Development are considered as RFFA's. The potential Impacts to wildlife may be underestimated for RFFA's, particularly if exploration and development are considered as it is with the other RFFA's.
Chapter 4: Environmental Consequences	Table 4.5-1	4.5-2	"Recreation experiences for visitors to the Lake Clark park unit may be impacted by the increased sight of human-made development from the roadway and ferry terminal."	It is unclear why the table lists Lake Clark NP experiences as a key issue for the APA, while failing to mention the McNeil River State Game Refuge. APA components (access road and Amakdedori Port) are situated directly in view and earshot of McNeil River SGR visitors at Chenik Bay and experiences may be effected. Add McNeil River SGR to summary of visitor experience issues for APA and Alt 1.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4: Environmental Consequences	Table 4.5-1	4.5-3	"Potential for slight increase in recreation use due to increase in full-time resident population and potential for additional recreation use along the pipeline right-of-way (ROW)."	This key issue summary does not seem reflect the full picture. It would be expected that there would be a significant increase in recreational use along the southern access route (not just the pipeline ROW) by locals and others accessing areas previously not accessed, as well as new residents.
Chapter 4: Environmental Consequences	4.5.3.2 Transportation Corridor	4.5-6	"Roadway truck traffic of up to 39 round trips per day would result in noise-related impacts to the recreation setting about 1 to 2 miles from the roadway (see Section 4.19, Noise, for more information)." "Magnitude of impacts would be medium due to the ~~limited~~ amount of truck traffic and number of recreationists impacted."	Elsewhere in the document it references up to 35 round trips by truck traffic. Check all references to number of round trips by vehicle traffic and update. As noted elsewhere, these figures and subsequent analysis should also include the estimated vehicle traffic from permitted local and commercial traffic and additional small mine vehicles that is documented in the PFEIS. Additionally, the amount of truck traffic cannot be characterized as "limited" given the proposed 35 - 39 round trips with doubles (truck every 18 - 20 minutes). It would be more accurate to move the "limited" to qualify the number of recreationists.
Chapter 4: Environmental Consequences	4.5.3.2 Transportation Corridor	4.5-6	"Impacts on recreation opportunities and experiences in this area would be similar to those described above for the mine site but would last beyond the life of the project until the roads are decommissioned and reclaimed."	Impacts to hunting, fishing, wildlife viewing and other recreation opportunities along the transportation corridor are not expected to be similar to the mine site and should be detailed here. Guides and hunters are limited to lands between Lake Clark NP and McNeil River. Opportunity in this area is limited and already occupied, some say crowded, by viewers and hunting guides. Impacts to these limited opportunities, and the resources that drive those opportunities is a significant issue and needs to be analyzed and detailed. In addition to lost opportunity, the analysis should also look at potential for increased pressure and use. Current proposal states the road would be restricted access; but allows for locals & business to get permitted access. If any of these entities are operating hunting, fishing, or ecotourism businesses this may offer an unfair advantage, place increased pressure on resources and represent lost opportunities to existing users. The analysis should account for these.
Chapter 4: Environmental Consequences	4.5.3.2 Transportation Corridor	4.5-8	Discussion of impacts to snow machine use of Iliamna Lake needs to be clearer in its analysis of the disruption caused by ice breaking ferry. Existing text leads the reader to believe that a user merely needs to divert around open water taking a longer route. However, the open water created by the ferry will completely bisect the lake; so any diversion around means a significant diversion to either the north shore or south shore.	Revise section to clarify that ice breaking will bisect the lake and that a significant diversion of a users route may be needed and that will take them up onto adjacent uplands that may or may not be open to access.
Chapter 4: Environmental Consequences	4.5.3.2 Transportation Corridor	4.5-8	"While all project phases would adversely affect wildlife viewing and fishing experiences and opportunities around the Iliamna Lake portions of the transportation corridor, other locations around the lake would be available for displaced wildlife viewing and fishing use."	Fish and wildlife resources often occur in specific locations for specific reasons. It should not be assumed that the same habitat, resources and access or the same quality wildlife viewing and fishing opportunities would be available elsewhere; without detailed analysis of what opportunities are being lost and where similar opportunities exist elsewhere on the lake. Suggest revising conclusion.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4: Environmental Consequences	4.5.3.2 Transportation Corridor	4.5-9	Given the ~~distance of the transportation corridor from these areas,~~ intermittent visibility, and the low level of recreational use of the northern borders of both refuges, the magnitude of impacts to recreation experiences from the transportation corridor would be low and geographic extent of those impacts would be limited; however, they would be certain to occur and would last though mine operations and closure.	Bolded and underlined text refers to transportation corridors distance from McNeil River State Game Refuge. Distance of the transportation corridor to the Refuge is very close; in this case the distance from the refuge should not be used as a qualifier for having a limited impact on users. Suggest revising text as noted.
Chapter 4: Environmental Consequences	4.5.3.2 Transportation Corridor	4.5-9	"The project may also have effects on incidental wildlife viewing along the transportation corridor; although the primary recreation use in most of the transportation corridor is likely from other activities, such as hunting and fishing."	Revise text to add 'and fishing'.
Chapter 4: Environmental Consequences	4.5.3.2 Transportation Corridor	4.5-9	"Movement and distribution of bears and other terrestrial mammals through the transportation corridor to the McNeil River State Game Refuge, McNeil River State Game Sanctuary and Katmai National Park and Preserve may be disrupted; therefore, construction and operations activities may have ~~some~~ indirect adverse impacts on ~~incidental~~ wildlife viewing in ~~both of~~ these recreation areas."	Movement and distribution of bears would also affect McNeil River State Game Sanctuary. Additionally, wildlife viewing at all three of these areas; specifically at Chenik Bay, McNeil River camp, and in the Funnel - Moraine Creek areas is a primary draw to these areas, and not incidental. Suggest revising text as noted.
Chapter 4: Environmental Consequences	4.5.3.2 Transportation Corridor	4.5-9	"Changes in bear behavior from human exposure or food conditioning at project facilities could lead to bears that are ~~more~~ adversely affected by or habituated to human activity ~~and/or more wary of human encounters~~. The magnitude of those impacts to bear viewing areas, hunting and fishing camps, or in conjunction with other recreational activities, are unknown."	The potential for bear-human conflicts in recreational activities extends beyond just bear viewing and bears potentially staying away from viewing areas. While disturbances, hazing or other aversive encounters may make bears more wary or avoid viewing areas; it is just as likely that food conditioning and unsecured attractants may cause bears to be aggressive causing bodily harm or other damage at bear viewing areas, hunting and fishing camps, or in conjunction with other recreational activities. Suggest revising text as noted.
Chapter 4: Environmental Consequences	4.5.3.2 Transportation Corridor	4.5-9	Limited access to the roadways and ferry terminals would be available to local residents and businesses only (see Section 4.3, Needs and Welfare of the People—Socioeconomics). Therefore, the transportation corridor facilities would induce ~~a~~ ~~small~~ an unknown amount of recreation and expose ~~some~~ previously inaccessible areas to public access and use from a few residents near the mine and port access roads (PLP 2018-RFI 027).	The southern port access road would open up an expansive area to public access that was previously only accessible by airplane or other limited overland travel. Further the ultimate level of use is not researched or documented and it is unclear what that would be. Additionally, it is unclear what "local residents and businesses" entail. If local residents have or initiate a hunting, fishing or ecotourism business and are allowed access along the road then that may significantly alter recreational use and resource consumption pressures in that area. Especially since the long term RFFA is that the road would be retained. The text should be revised to reflect an unknown but possibly significant change.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4: Environmental Consequences	4.5.3.3 Amakdedori Port	4.5-10	"These impacts would be long term and certain to occur if the port is built; ~~however, Cook Inlet is large with expansive shorelines and waters available nearby for any boaters displaced from construction or operation of the port or lightering sites."~~ "There is known bear hunting at the port site, which would be eliminated for the duration of the project due to port activities and noise. Hunters would be displaced to other nearby bear hunting locations, such as State lands farther north." "Additionally, similar activities could be experienced in nearby locations."	There are at least two long term commercial guide camps and an airstrip at Amakdedori Creek a short distance from the proposed port site. The site is also used for recreational activities that occur at and along Amakdedori Beach, including hunting, fishing, boating, commercial fishing, beach combing, wildlife viewing, etc. The proposed port use may effect these existing hunting and recreation uses. These opportunities are specific to that location and the same opportunities are not necessarily available elsewhere. The PFEIS inaccurately assumes that these opportunities are available elsewhere and underestimates the impact of these lost opportunities.
Chapter 4: Environmental Consequences	4.5.3.3 Amakdedori Port	4.5-11	"In addition, project-related noise and activities during construction, operations, and closure at Amakdedori port would adversely affect the recreational experiences of visitors in view and earshot of the port site due to the change from a quiet, undeveloped area to a developed site with visible facilities, generators, and in-water facilities. The extent of the impact would be in view and earshot of the port. For the duration of the project, the adverse effects would displace visitors preferring a quiet, undisturbed recreation setting, or visitors who participate in recreation opportunities such as wildlife viewing, hunting, and fishing, which typically require a quiet, undisturbed recreation setting. Displacement would result in a permanent loss or reduction of opportunity ~~of these visitors would shift recreation use to other areas~~. Magnitude of impacts would be higher in summer months during the peak visitation period for McNeil River State Game Refuge and the Alaska Maritime National Wildlife Refuge."	As noted above for Amakdedori port site and beach; these opportunities are not necessarily available at other locations. Specifically, wildlife viewing activities at Chenik Bay / Creek are in direct sight and earshot of the Amakdedori Port site. Chenik is the primary access point and viewing area for the McNeil River State Game Refuge. Bears gather here, similar to McNeil River, for the fish resources entering the creek. This recreational opportunity cannot simply be shifted to another location. Revise text to show that these recreational opportunities are being lost.
Chapter 4: Environmental Consequences	4.5.3.3 Amakdedori Port	4.5-11	"Overall, because recreational use of the Amakdedori port site is estimated to be low, project-related wildlife and fish displacement, noise, and activities would have low magnitude impacts from displacement of the area's few wildlife viewing, hunting, and fishing users to other nearby shoreline areas."	As noted above these opportunities are not transferrable and displacement to other areas is not a reality. These will be permanent losses of opportunity. Additionally, we believe the characterization of use at the site to be low is in error. The FEIS should consider recreational use by Kenai Peninsula and Homer area residents and commercial entities, as well as those in the Lake Iliamna area.
Chapter 4: Environmental Consequences	4.5.3.3 Amakdedori Port	4.5-11	"These impacts on views would be long term and certain to occur if the port is permitted and built. On-water sightseeing and/or wildlife viewing may occur in these locations~~., but recreational use of McNeil River State Game Refuge shoreline areas is limited by permit numbers.~~"	Recreational use of McNeil River State Game Refuge shoreline areas is not limited by permit numbers. As with the rest of the Refuge; certain activities may require a Special Areas Permit to occur; but generally the refuge is open to public access and recreational use. The Sanctuary has limited permit only access.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4: Environmental Consequences	4.5.3.3 Amakdedori Port	4.5-11	"The port would not be visible from Augustine Island, but may affect views from Cook Inlet shoreline areas surrounding the port."	Check accuracy of this statement. Augustine Island is directly offshore from the Amakdedori Port site and the port should be directly viewable from the island.
Chapter 4: Environmental Consequences	4.5.3.3 Amakdedori Port	4.5-11	The project would not result in changes in access to McNeil River State Game Refuge or Sanctuary. ~~Visitors fly in to the sanctuary where the main recreational use areas are located.~~ McNeil River Camp, the main access point to the sanctuary ~~and refuge~~, is 12 miles south of the Amakdedori port site.	As noted above the main recreational use and access point of the McNeil River State Game Refuge is at Chenik Creek / Chenik Bay. The main recreational access point of the McNeil River State Game Sanctuary is at McNeil River camp. Some changes in access to the Refuge might be expected at Chenik Bay / Creek if displacement occurs as noted in PFEIS.
Chapter 4: Environmental Consequences	4.5.3.3 Amakdedori Port	4.5-11	Impacts to night sky affecting visibility of stars could affect a small portion (about 2 percent) of McNeil River State Game Refuge.	While a small part of the Refuge may be affected it is at the primary recreational access point at Chenik Bay, thus the impact would affect the majority of refuge users and one of the more important public use areas of the refuge. Revise text to accurately depict the significance of the impact.
Chapter 4: Environmental Consequences	4.5.3.3 Amakdedori Port	4.5-11	Construction, operations, and closure at Amakdedori port could adversely affect the recreational experience for visitors participating in sightseeing or wildlife viewing opportunities in these surrounding areas by causing a change in the recreational setting to a more developed and less remote, primitive area; however, impacts would be of low magnitude due to the low number of visitors.	Please provide information regarding how the conclusion in the PFEIS determined "low" visitor numbers. The ADF&G only collects incidental use data at Chenik Bay / Creek and what is available is typically for about a 2 week period in July. Over the last four years visitation has averaged 78 visitor use days during this period. However, use at the site continues outside this window and public use is higher than documented. Regardless of numbers, the importance of the site to Refuge visitation and the inability to simply displace the wildlife viewing activities occurring at Chenik to other areas should be factored into the analysis of the magnitude of the impacts. consider revising text and conclusion.
Chapter 4: Environmental Consequences	4.5.3.3 Amakdedori Port	4.5-13	The pipeline would be south of Augustine Island in Cook Inlet. ~~Although no recreation occurs on the island itself~~, some sightseeing of the island's volcano and wildlife occurs from the water.	Homer area recreationists are known to hike and otherwise recreate on Augustine Island. Suggest revising text and analysis.
Chapter 4: Environmental Consequences	4.5.5.2 ALT 2 - Transportation Corridor	4.5-16	"Impacts to recreational fishing under Alternative 2 would be the same as those described under the Applicant's Preferred Alternative; however, there are more guided fishing operations that could be impacted by Alternative 2." "Impacts to boating and snow machine use on Iliamna Lake would be the same as those discussed under the Applicant's Preferred Alternative (see Section 4.12, Transportation and Navigation, for impacts to non-recreational lake traffic)."	While the types of impacts to fishing, boating and snowmaching may be similar; the actual impacts are likely quite different. The ferry route cuts N-S across the middle of Lake Iliamna in the APA; and E-W through the eastern end of Lake Iliamna in ALT2. Two very different types of habitat and terrain. These two scenarios likely have very different impacts to hunting and fishing access in terms disruption to snow machine traffic routes for hunting, trapping and fishing; displacement of fishing, wildlife viewing and boat use in the eastern end of the lake. Present separate analysis for impacts under each scenario
Chapter 5: Mitigation	Table 5-2 Applicants Proposed Mitigation	5-11	When wildlife (especially bears, caribou, moose, wolves, raptor nests, flocks of waterfowl, seabirds, or marine mammals) are observed, avoid flying directly overhead and maximize lateral distance and altitude ~~as quickly as possible~~.	text should be reworded. Disturbance response in many species of wildlife is caused by sudden changes in engine noise which can be caused by sudden changes in direction or acceleration. Additionally, flying above 1,500 ft will likely prevent disturbance to most species. Suggested revision in underlined sentence.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 5: Mitigation	Table 5-2 Applicants Proposed Mitigation	5-23	BMPs and design guidelines would incorporate avian protection for all powerlines.	Recommend powerlines should be installed underground in areas of high avian use such as waterfowl around ponded areas, and coastal shorelines.
Chapter 5: Mitigation	Table 5-2 Applicants Proposed Mitigation	5-28	"PLP would signpost and maintain road crossings for all terrain vehicles (ATV) or snow machine use wherever the access road intersects existing trails."	The road corridor, access restrictions and methods used in providing crossings directly effect hunting, trapping, fishing and recreational access. Recommend expanding mitigative options to provide bridged or culverted underpasses or overpasses depending on level of trail use and trail, road and terrain elevations.
Chapter 2: Alternatives Chapter 5: Mitigation	Table 5-3, Applicants Project Enhancements and Optimizations	5-36	Caisson and causeway design, or pile supported dock design, are an improvement over the solid fill causeway. However, there should be no reason to have upland fill limits of the Port pad extend down to the high tide line.	In order to avoid impacts to shoreline habitats and wildlife movements, the port pad limits should be placed back from the upper tidal area to provide a upland habitat fringe along the shoreline, with free spans over this fringe and the shorezone to allow for wildlife and recreational traffic passage along the shore.
Chapter 4: Environmental Consequences Chapter 5: Mitigation	4.23.2.1 Mitigation Table 5-2, Proposed Mitigation	4.23-12 5-30	"The height of snowbanks would be reduced during wintertime to increase driver visibility."	This mitigation measure is included in Chapter 4.23 and PLP 2019-122 as a wildlife safety measure. It should be included in the proposed mitigation table. Additionally, the winter management of snow berms along roadways should also include periodic breaks or cleared areas in snow berms to allow wildlife to get off the road during the approach of oncoming vehicles.
Chapter 5: Mitigation	Table M-1 Assessment of Mitigation	M-7	"Incorporate measures to deter birds from the pit lake and other process water ponds; such as active hazing (boat and/or drone) or other deterrents." Waterfowl and other birdlife should be prevented from using standing water that does not meet water quality standards (i.e. metals, acidity, etc.) in mine pits, tailings ponds or other retention ponds for as long as water does not meet water quality standards. Which may be beyond the life of the project. Metals and other contaminations can also be carried up the food chain to predators.	Recommend including potential bird interaction with the pit lake and other process water ponds in the mitigation plan
PLP 2019-122 Chapter 5: Mitigation	Table 5-2 Applicants Proposed Mitigation Table 5-3 Applicants Project Enhancements	5-7 5-36	PLP 2019-122 notes that "The port facility will be fenced-in using chain-link fences and/or electrical fences. The road entrance will have a gate and the fence will extend onto the causeway as needed to limit access from the intertidal zone." The ADF&G concurs with a high chain link perimeter fence and gate. Electric fencing may be used in addition. However, this measure is not included in the applicants proposed mitigation or Project Enhancements and Optimizations within the PFEIS.	Incorporate measure into project enhancements or proposed mitigation. "The port facility will be fenced-in using chain-link fences and~~/or~~ possibly electrical fences. The road entrance will have a gate and the fence will extend onto the causeway as needed to limit access from the intertidal zone."

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
PLP 2019-122 Chapter 5: Mitigation	Table 5-2 Applicants Proposed Mitigation Table 5-3 Applicants Project Enhancements	5-7 5-36	Many of the design features and wildlife mitigation measures committed to by PLP in PLP2019-122 are not incorporated into the Applicants Proposed Mitigation and Applicants Project Enhancements within the PFEIS.	Update Chapter 5 Mitigation and Appendix M Mitigation Analysis to incorporate measures committed to in PLP2019-122 as well as other agency submitted measures.
PLP 2019-122 Chapter 5: Mitigation	Table 5-2 Applicants Proposed Mitigation Table 5-3 Applicants Project Enhancements	5-7 5-36	PLP 2019-122 notes "Secure bear-resistant storage will be used for handling food and garbage." and hazardous materials bear-proof storage should be used for food and garbage, and industrial attractants.	Update measure to reflect bear-proof storage and containers will be used; and incorporate into Chapter 5 and Appendix M.
Chapter 5: Mitigation	5.2.3 Additional Mitigation	5-40	PLP proposes a number of mitigation measures involving signage, speed limits, wildlife detection systems, etc. Determination of important wildlife use and movement areas are necessary in order to determine the location of these measures. Post construction "adaptive management" data collection will be responding to a post construction disturbed population and environment. Data is needed prior to construction in order to avoid conflicts and implement measures at the correct locations. Adaptive management can be used after construction to respond to any further needs.	In order to determine the proper placement of facilities, proper design features and determine appropriate mitigation measures to avoid or minimize impacts from injury, mortality, behavioral avoidance, habitat fragmentation, and wildlife viewing areas; it will be necessary for the applicant to complete brown bear, moose, and caribou habitat use, movement, and bear denning surveys in order to determine important habitat use areas to be avoided or to implement design features at.
Chapter 4: Environmental Consequences Chapter 5: Mitigation	4.23.2.1 Mitigation Table 5-2, Proposed Mitigation	4.23-12 5-32	"Any wildlife injuries or mortalities would be immediately reported as appropriate. The carcasses of any road-killed animals would be removed and disposed of in a timely manner so that they do not serve as an attractant to bears or other wildlife."	Mitigation measure should include coordinated communications with ADF&G or local law enforcement in order to salvage fresh useable game species for community food.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
PLP 2019-122 Chapter 5: Mitigation	Table 5-2 Applicants Proposed Mitigation Table 5-3 Applicants Project Enhancements	5-7 and 5-35	PLP 2019-122 notes: "Food and Garbage Management o Feeding and attracting of wildlife by project personnel will be prohibited. o Food will be kept inside buildings and only permitted inside vehicles for short periods, when workers are unable to use the dining facilities. Food and garbage will be disposed of in dedicated trash containers at each site, and routinely emptied to limit buildup of odors that could attract wildlife. o Trash containers inside fenced areas will be located away from the fence line to minimize wildlife attractions o Any food wastes that could attract wildlife will be temporarily stored in enclosed containers, and periodically backhauled to the mine site for incineration and disposal."	Food and garbage needs to be kept in bear-proof containers, bear-proof trash receptacles, and regularly emptied and backhauled for incineration and disposal. Food should only be left inside vehicles or other unsecured locations when staff are present and can remove the food source in response to wildlife attracted to the food source. these measures also need to be incorporated into the PFEIS mitigation chapters.
Chapter 5: Mitigation	5.2.3 Additional Mitigation	5-40	Additional mitigation measure to add to Appendix M	Facilities must be designed and operated to minimize sight and sound impacts in areas of high recreational, and subsistence use and important wildlife habitat. Methods may include providing natural buffers and screening to conceal facilities, sound insulation of facilities, or by using alternative means approved in consultation with ADF&G and the appropriate land manager.
Chapter 5: Mitigation	5.2.3 Additional Mitigation	5-40	Additional mitigation measure to add to Appendix M	A lessee who encounters an occupied brown bear den not previously identified by ADF&G must report it to the Division of Wildlife Conservation, ADF&G, within 24 hours. Mobile activities shall avoid such discovered occupied dens by one-half mile unless alternative mitigation measures are approved with concurrence from ADF&G. Non-mobile facilities will not be required to relocate. Before commencement of any activities, lessees shall consult with ADF&G to identify locations of brown bear den sites. Additional surveys may be required pre and post construction to determine denning areas and changes in denning use due to project impacts.
Chapter 5: Mitigation	5.2.3 Additional Mitigation	5-40	A detailed Bear Interaction Plan designed to minimize conflicts between bears and humans needs to be part of PLP's Wildlife Interaction Plan. PLP needs to coordinate development of this plan with ADF&G staff. Example plans have previously been provided to PLP. But no PLP draft plans have been provided or noted within the Wildlife Interaction Plan.	At a minimum the plan should include measures to: A. minimize attraction of bears to facility sites; B. organize layout of buildings and work areas to minimize interactions between humans and bears; C. warn personnel of bears near or on facilities and the proper actions to take; D. if authorized, deter bears from facility sites; E. provide contingencies in the event bears do not leave the site; F. provide for the proper storage and disposal of food, garbage or other industrial materials that may be attractants to bears; G. provide for the proper storage and disposal of materials that may be toxic to bears; H. provide a systematic record of bears on the site and in the immediate area: and I. additional measures as developed in consultation with ADF&G.

Return to Excerpt

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 3:Affected Environment	3.23	3.23-36	"Because the June survey was missed, these surveys may have missed the peak nutritional time period for coastal sedge meadows, which occurs in June. Therefore, surveys may underestimate the total number of bears, or bear use of the coastal sedge meadows along Cook Inlet by Amakdedori and the port access road. Bear observations were widely dispersed and no concentration areas were observed (Figure 3.23-12). A few bears were detected around Ursus Cove and Bruin Bay, ...ABR 2011c"	We agree that surveys likely missed peak use and underestimate the total number of bears in this area. Well-timed surveys should be conducted to enumerate the use of seasonally important habitats.
Chapter 3:Affected Environment	3.23.3.2	3.23-63	Large numbers of brown bears were observed in the sedge meadows and mudflats at the heads of Iniskin and Chinitna bays during spring and summer each year, with the highest numbers in June (ABR 2011c)."	The FEIS should acknowledge that seasonal use of these areas (aside from Iniskin and Chinitna) and potential aggregations are not well surveyed or understood.
Chapter 3:Affected Environment & Chapter 4: Wildlife Values	4.23-1	3.23.1 & 4.23-2	"The EIS analysis area for wildlife varied depending on the species and project component due to differences in species biology and potential impacts from different project components."	The size of the analysis area for terrestrial mammals should have been developed using species ranges and life histories. Included in terrestrial mammals are black bear (edge of edge of their range), brown bear, caribou, moose, and wolves which represent quite a range of large home ranges and life history requirements.
Executive Summary	Section 3.3.1.1	67-68	Description of fisheries potentially impacted by the natural gas pipeline across Cook Inlet focuses on Upper Cook Inlet (UCI) drift gillnet fishery and does not mention Lower Cook Inlet (LCI) purse seine, longline, pot cod or scallop dredge fisheries. Although these fisheries are mentioned in later sections, they should be included here as well.	Add brief description of potentially impacted LCI fisheries to this section of the Executive Summary.
Executive Summary	Section 3.3.2.1	70	PFEIS states "there would be permanent direct mortality of benthic organisms beneath the natural gas pipeline footprint on the seabed of Cook Inlet, including about 6.8 acres of weathervane scallop beds that would be temporarily impacted by placement of the pipeline". It seems inappropriate for "permanent, direct mortality" to be described as a temporary impact later in the same sentence.	Strike "temporarily impacted" from this sentence and replace it with an estimate of the number of weathervane scallops in the 6.8 acre impact area that would be permanently impacted (i.e., killed) by this activity. That information is provided later in the document and should be included here as well.
Executive Summary	Section 3.3.2.2 Comm Fishing	pg 76	"The Diamond Point port site is near a chum salmon fishery that does not experience harvest every year". While true, this statement ignores two key details: 1) the Cottonwood Creek chum salmon stock can yield significant harvests in some years and 2) the proposed port site is located at a location seiners traditionally fish to target this stock. Port operations would likely preclude their ability to continue fishing this stock in the manner they have historically done. These facts are mentioned elsewhere in the EIS and should be included here as well.	Edit sentence to be more accurate and balanced, such as: "The Diamond Point port site is near Cottonwood Creek, home of a chum salmon stock capable of supporting substantial commercial harvests in some years; construction/operation of the port would impact historical fishing activities in this area, potentially resulting in loss of harvest", or words to that effect.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Executive Summary	Section 3.3.2.2 Comm Fishing	pg 76	Discussion of the natural gas pipeline impacts to Cook Inlet commercial fisheries focuses on salmon and groundfish and does not mention herring, crab or scallops. Although currently closed, herring, crab and scallop fisheries have historically occurred in Kamishak Bay and if habitat quality is maintained, there's no reason to expect stocks won't recover (and fisheries reopen) during the life of this project. These facts are mentioned elsewhere int the EIS and should be included here as well.	Include discussion of other historical fisheries in this area that could re-open (and be impacted) during the life of this project if stocks recover.
Executive Summary	Section 3.3.2.2 Recreational Fishing	pg 76-77	Under the header Recreational Fishing, the Executive Summary mentions the Chenik subdistrict salmon fishery and the Kamishak Bay salmon and weathervane scallop fisheries, none of which are recreational. These are current (salmon) and historical (herring and scallop) commercial fisheries. Likewise, this section references long-term adverse impacts to the "angling experience" associated with the Cottonwood Creek chum salmon stock if the Diamond Point port site is used. To my knowledge, there is no angling effort on this stock, only commercial purse seine fishing.	Move discussion of these potential impacts to the Commercial Fishing section.
Executive Summary	Section 3.4.2 Wetlands and other Water- Expected Effects	pg 93-95	At two locations on pg 93 (and one on pg 95) of the Executive Summary, discussion of potential impacts resulting from construction of a port at Diamond Point states "The extent of direct impact would be restricted to the Chinitna River-Frontal Cook Inlet watershed". This appears to be an error. Chinitna River is in Chinitna Bay, well north of the Diamond Point port site and should it be outside the direct impact zone.	Correct the description of the directly impacted area so it accurately describes the area around Diamond Point, not Chinitna Bay.
Chapter 2 Alternatives	Sections 2.2.6.3 and 2.2.6.6	Pages 2-124 and 2-130	Regardless of which dock variant is used at the Diamond Point port (earthen or pile supported), the causeway/dock will likely impede commercial purse seine operations targeting Cottonwood Creek chum salmon. When this location was being considered as a "rock quarry" several years ago, seine permit holders informed us that they set their gear directly off Diamond Point. That activity would likely no longer be possible if the port is located there.	Provide details regarding how operation of the port can be conducted so it is compatible with commercial purse seining activities in this area.
Chapter 2 Alternatives	Section 2.2.6.4	Page 2-125	Under Alternative 2, the PFEIS indicates the natural gas pipeline would come ashore at Ursus Cove and then proceed overland to Cottonwood Bay via a 150-ft temporary construction ROW easement. This easement appears to be up the Brown's Peak Creek drainage, an anadromous stream supporting all 5 species of Pacific salmon as well as Dolly Varden char. The PFEIS does not provide sufficient detail on the exact route or construction of the pipeline ROW up Brown's Peak Creek for reviewers to assess potential short and long-term impacts to this creek, which has a pink salmon escapement goal and is periodically targeted by commercial fisheries.	Provide a more detailed description of the route and construction of the pipeline ROW between Ursus Cove and Cottonwood Bay, including measures that will be taken to avoid impacts to fishery resources in Brown's Peak Creek. Also, provide additional detail on the pipeline transition from marine waters to uplands of Ursus Cove and how it will be designed to avoid impacting commercial purse seine operations in that area.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 2 Alternatives	Section 2.2.6.6	Page 2-130	Under Alternative 2, the PFEIS indicates an access trestle and pile supported dock variant for the proposed earthen access causeway at Diamond Point.	Suggest making this the preferred Diamond Point dock design. This variant would significantly reduce in-water impacts over the proposed earthen access causeway and jetty. It would reduce the bottom impacted by fill to less than 4 acres total. A piling dock would also reduce impacts to migration by juvenile and adult salmon leaving and returning to Cottonwood Creek, an anadromous stream at the head of the bay that supports a chum salmon stock with an escapement goal that is periodically targeted by the commercial purse seine fishery.
Chapter 3 Affected Environment	Section 3.24.4.6	Page 3.24-85	The PFEIS states that for the Cook Inlet Portion of the Natural Gas Pipeline Corridor "The affected environment of the Cook Inlet portion of the natural gas pipeline is the same for all alternatives." This is incorrect, as the route in Kamishak Bay is different for Alternatives 1 and 2 or 3. This is important since the supporting intertidal and subtidal baseline studies differ between the two routes.	Add additional detail for the Cook Inlet portion of the gas pipeline for the alternatives.
Chapter 3 Affected Environment	Section 3.24.4.6	Page 3.24-86	In the Anadromous and Resident Fish Distribution section, a species list of salmon, forage fish, and groundfish is given along with a summary of the finding of one study (Robards et al. 1999). There are many fish studies from the Cook Inlet area other than those listed. Lacking in this subsection are biomass estimates, or perhaps more appropriately for this EIS, density estimates for marine fish. These data are readily available from ADF&G and the NMFS. The proposed impacts to fish and wildlife from activities or accidents associated with the project are quantified in many sections of the PFEIS. Many of these estimates are arrived at by assessing the abundance or density of the impacted species within the affected area. There is no context in a list of organisms, since a list just provides occurrence, not the frequency of occurrence, abundance, biomass, or density of the population. The following subsection (Aquatic Invertebrates) does provide some metrics (Shannon-Weaver Diversity, and density in animals/m2) in which to gauge the importance of aquatic invertebrates in lower Cook Inlet to other areas and possibly for assessing potential impacts. Since groundfish are vital to lower Cook Inlet communities, economy, and the ecosystem in general, similar metrics should be provided for fish.	Marine forage fish, groundfish, and shellfish compose prominent fisheries resources in the region. ADF&G's Kamishak Bay bottom trawl survey provides abundance, biomass, and density estimates for commercially important shellfish and groundfish. Of some of the most high valued commercial groundfish species, Pacific halibut (*Hippoglossus stenolepis*) on average from 1998 to 2012 (the last year of the survey) had the highest estimated biomass at 10.2 million pounds with an average density of 13,194 lbs/Nmi2, followed by Pacific cod (*Gadus macrocephalus*) at 6.8 million pounds with an average density of 8,769 lbs/Nmi2, walleye pollock (*Gadus chalcogramma*) at 6.3 million pounds with an average density of 8,139 lbs/Nmi2 and longnose and big skates at 7.5 million pounds combined with an average density of 4,429 lbs/km2. Commercially harvested flatfish: arrowtooth flounder (*Reinhardtius stomias*), butter sole (*Isopsetta isolepis*), flathead sole (*Hippoglossoides elassodon*), rock sole (*Lepidopsetta bilineata*), dover sole (*Microstomus pacificus*), rex sole (*Glyptocephalus zachirus*), English sole (*Parophrys vetulus*), starry flounder (*Platichthys stellatus*), Alaska palaice (*Pleuronectes quadrituberculatus*), and yellowfin sole (*Limanda aspera*), averaged in aggregate an estimated 89.3 million pounds with an average density of 115,500 lbs/Nmi2 in the Kamishak Bay bottom trawl survey. Commercially harvested rockfish: dusky rockfish (*Sebastes ciliatus*), Pacific Ocean perch (*Sebastes alutus*), redbanded rockfish (*Sebastes babcocki*), and redstripe rockfish (*Sebastes proriger*), averaged an estimated biomass of 168,000 pounds while sablefish (*Anoplopoma fimbria*) was 384,000 pounds. Other commercial important groundfish captured in the trawl survey include lingcod and spiny dogfish. Since the amount of disturbance of activities such as burial of the gas line is quantified in the PFEIS, the impacts to fish should be assessed relative to the known density of those species.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 3 Affected Environment	Section 3.24.4.6	Page 3.24-86	Following the same reasoning as the previous comment, at a minimum, Tanner crab metrics should be provided in the Macroinvertebrates subsection.	The average Tanner crab (*Chionoecetes bairdi*) abundance for all male and female crab from 1998 to 2012 from the ADF&G Kamishak Bay bottom trawl survey was 8.6 million crab with an average density of 11,185 crab/Nmi2. These section should include the same for Dungeness crab, pandalid shrimp, and other harvested macroinvertebrates as well as those known to play important ecological roles.
Chapter 3 Affected Environment	Section 3.24.4.6	Page 3.24-86	In the Macroinvertebrates subsection, razor clams are said to be concentrated in the "Polly Creek area on the western side of Cook Inlet, and along the eastern side from Anchor Point to Kasilof River", but there is no mention of them occurring within the natural gas pipeline route at Amakdedori Port (GeoEngineers 2018c).	Include razor clam occurrence in the pipeline route at Amakdeori Port including a density and abundance estimate.
Chapter 3 Affected Environment	Section 3.24.4.6	Page 3.24-87	The PFEIS states that octopus are no longer commercially harvested in Cook Inlet.	There is an annual commercial harvest of giant Pacific octopus (*Enteroctopus dofleini*) in the Cook Inlet Management Area which currently has a guideline harvest level of 35,000 lbs.
Chapter 3 Affected Environment	Section 3.24.4.6	Page 3.24-87	The PFEIS states that "Few demersal fish were observed. Bottom-oriented fish like whitespotted greenling (*Hexagrammos stelleri*), starry flounder (*Platichthys stellatus*), and other flatfishes (order *Pleuronectiformes*) were common." Those species are demersal, yet the first statement says few were observed.	Correct this statement.
Chapter 3 Affected Environment	Section 3.24.5.2 Anadromous and Resident Fish Distribution	Page 3.24-90	Title does not fully reflect the content of this section, as marine fish are also discussed.	The title of this section should read: Marine, Anadromous, and Resident Fish Distribution since all 3 groups are discussed.
Chapter 3 Affected Environment	Section 3.24.5.2	Page 3.24-90	The following statement is not entirely accurate: "Sockeye are abundant in several tributaries to Kamishak Bay, including the Kamishak, Paint and McNeil rivers, and Kirschner, Mikfik, and Chenik lakes". Paint River has had hatchery sockeye planted periodically in years past but does not currently support a sockeye salmon run, despite the fish ladder being open to facilitate adult returns. Sockeye salmon returning to the McNeil/Mikfik drainage all go up Mikfik Creek to Mikfik Lake and very few, if any, spawn in McNeil River. Also, Kirschner is a perched lake not accessible to anadromous fish. Sockeye fry planted in the lake by Cook Inlet Aquaculture Association return to the area as adults but they cannot reach the lake to spawn naturally and are therefore harvested in marine waters below the falls.	Remove Paint and McNeil Rivers and Kirschner Lake from the list of waterbodies in Kamishak Bay that support abundant natural returns of sockeye salmon.
Chapter 3 Affected Environment	Section 3.24.5.2	Page 3.24-90-91	The list of basins supporting strong runs of pink salmon in Kamishak Bay is not complete.	Add Kamishak Rivers (Big and Little Kamishak)
Chapter 3 Affected Environment	Section 3.24.5.2	Page 3.24-91	The list of basins supporting strong runs of chum salmon in Kamishak Bay is not complete.	Add Douglas River and Ursus Lagoon Creeks

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Executive Summary and Chapter 4.27 Spill Risk	Section 3.5.2 Diesel spills (ES) and 4.27.4.5 in Ch. 4.27	pg 98-99 (ES) and pages 4.27-25 to 4.27-40.	The marine diesel spill section (which predicts impacts from a 300,000 gallon fuel barge spill) states: "Impacts to marine mammals would be of low likelihood and temporary; individuals or groups could potentially be injured or die, but measurable impacts to the overall population are unlikely". How was this conclusion reached? That statement is in direct conflict with a statement on the next page (pg. 99): "Potential impacts from a marine diesel spill to TES [threatened and endangered species] could be of high magnitude, depending on the species and fate of the spilled fuel."	Provide supporting information on the conclusion that impacts of a 300,000 gallon marine diesel spill to fish, birds, and marine mammals would be "of low likelihood and temporary" with measurable impacts to the overall population "unlikely". Also, reconcile that conclusion with the subsequent recognition that potential impacts to TES could be of high magnitude.
Executive Summary and Chapter 4.27 Spill Risk	Section 3.5.4 Copper-Gold Concentrate Spills (ES) and 4.27.6.1 Copper-Gold Concentrate	pg 100 (ES) and 4.27-44 and 45 (Ch 4.27).	The Executive Summary states: "The dissolved metals in the aqueous phase of the concentrate slurry could have acute impacts on the aquatic environment that would likely be temporary and localized". Copper toxicity can be lethal to aquatic organisms and can also cause other detrimental impacts to juvenile salmonids through impaired sensory perception. The latter points are recognized on pg 103 (Executive Summary) under the "Biological Impacts of Tailings Release Scenarios", but much of the discussion on this topic seems to assume the spill would happen in flowing waters with the expectation that contaminants would eventually be diluted downstream, reducing the potential for acute metal toxicity.	Further expand discussion of potential impacts of concentrate spills into non-flowing and marine waterbodies and add information to support the conclusion that impacts would likely be "temporary and localized".
Chapter 3: Affected Environment	Section 3.6.1.1; Section 3.6.1.2	Pages 2 and 4	"Over the last 20-years average annual harvest were ….".	Define which years the 20-year average is based on. This should be done every time an average is stated.
Chapter 3: Affected Environment	Section 3.6.1.1	Page 2	As discussed in the December 16, 2019 technical meeting, this document leaves out information from the commercial fishery in 2018 and 2019. Both of these years set some records in terms of run size, harvest, and exvessel value. The authors were resistant to updating the averages, but agreed to provide details about these years in the text of the document. The details were added as a footnote in the appendix, but not mentioned in Chapter 3.	Bristol Bay sockeye harvest in 2018 was 41.9 million (2018 Bristol Bay Annual Management Report). The sockeye harvest in 2019 was a preliminary 43.0 million and was the second largest sockeye salmon harvest on record (2019 Bristol Bay Salmon Season Summary). Please include the 2018 and 2019 harvest data in the analysis.
Chapter 3: Affected Environment	Section 3.6.1.2	Page 4	As discussed in the December 16, 2019 technical meeting, this document leaves out information from the commercial fishery in 2018 and 2019. Both of these years set some records in terms of run size, harvest, and exvessel value. The authors were resistant to updating the averages, but agreed to provide details about these years in the text of the document. This has not been done.	Nushagak River total run was 7.7 million 2017, 9.4 million in 2018, and 4.3 million in 2019. Please include the 2018 and 2019 harvest data in the analysis.
Chapter 3: Affected Environment	Section 3.6.1.2	Page 4	"In the context of other Bristol Bay rivers and other Alaska rivers such as the Kenai River and the Copper River, the Nushagak River does not particularly stand out for the average size of its sockeye salmon run."	Expand analysis to capture recent years: However, in 2018 the Nushagak River total run was nearly four times larger than the combined total runs of Kenai River and Copper River. In 2017, the Nushagak River total run was nearly two times larger than the combined total runs of Kenai River and Copper River.
Chapter 3: Affected Environment	Section 3.6.1.2	Page 6	"In 2017, the Bristol Bay commercial salmon fishery generated $216.4 million in ex-vessel payments to all Area T permit holders, making that year the second-best year for permit holders"	Expand analysis to capture recent years: The 2019 preliminary exvessel value of $306.5 million of all salmon species ranks first in the history of the fishery (BB season summary).

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 3: Affected Environment	Section 3.6.1.3, Figure 3.6-9	page 3.6-14	Figure 3.6-9 is sourced from the ADLWD (Alaska Department of Labor and Workforce Development). 2018a. Bristol Bay Fishing and Seafood Industry Data. Unfortunately the figure incorrectly has the Friedman Family Fisheries listed in Dillingham and the Ekuk fisheries shore plant in Ekwok when they are both in Ekuk.	Suggest making a new figure or footnoting the existing figure to correct the locations.
Chapter 3 Affected Environment	Section 3.6.2.1	Page 3.6-20	The values reported for salmon harvests from the Chenik/Amakdedori subdistrict are inaccurate. It appears the source for your values was information provided by ADF&G enclosed in review comments for an earlier draft of the EIS (ADF&G 2018a) and that our query of the fish ticket database done at that time was in error. The average commercial common property salmon harvest from the Chenik/Amakdedori subdistrict between 1997-2018 during years when harvest occurred was 57,596 sockeye, 3 coho, 791 pink, and 353 chum. During these years, sockeye salmon harvest ranged from 5,471 fish to over 171,255 fish, with a median harvest of over 54,205. ADF&G would be able to provide the yearly values for each species upon request.	Revise the narrative on this page with the corrected values and contact ADF&G if you'd like a spreadsheet with the corrected harvest information.
Chapter 3 Affected Environment	Section 3.6.2.1	Page 3.6-22	The top of page 3.6-22 includes the statement: "ADF&G LCI finfish management reports do not mention harvest in Iliamna Bay where the Amakdedori port would be located". It should say "… where the Diamond Point port would be located". Even with that correction, this statement is incorrect. Figure 13 in the referenced report (Hollowell, Otis, and Ford 2017) clearly shows that the Cottonwood Bay subdistrict (249-83) includes all of both arms of Cottonwood and Iliamna Bays. Chum salmon are harvested from this subdistrict fairly regularly and in fact fishing effort does concentrate in the vicinity of Diamond Point. When this location was being considered as a "rock quarry" several years ago, seiners were concerned and reported that Diamond Point was a preferred location to "hold a hook set" for chums milling in the bay prior to running up the creek. A port at this location would impact commercial purse seining targeting the Cottonwood Creek chum stock.	Correct both errors in the referenced statement.
Chapter 3 Affected Environment	Section 3.6.2.3	Page 3.6-29	The reference provided for the brief summary of Pacific herring harvests in Kamishak Bay is a crab, shrimp, and misc. shellfish report (Rumble, Russ, and Russ 2016) is incorrect. Pacific herring harvest information is reported in the department's Finfish AMR (e.g., see Hollowell, Otis, and Ford 2018; Appendix G2).	Change citation to Hollowell, Otis, and Ford 2018 as the source for the referenced Kamishak herring harvest summary of 2,520 ton average harvest between 1961 and 1999.
Chapter 3: Affected Environment	Section 3.24.4.1	Page 72	The sockeye run in the Newhalen River peaks from early to late September, with 1955-2002 index counts ranging from a low of 97 to a high of 300,000 fish and a 32-year mean of 85,000 fish (Morstad 2003).	These numbers are based on aerial survey estimates, which on average, represent approximately 18% of the actual abundance. They also appear to be inaccurate. The Newhalen River aerial survey estimate in 1987 was 730,900. These indices should be replaced with tower escapement estimates from FRI and NPS (e.g. Poe and Rogers 1984; Young and Woody 2009). In 1984, 3,091,620 were estimated to have passed the tower.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 3: Affected Environment	Section 3.24.4.2	Page 75	The text say "The extensive sockeye spawning run in the Gibraltar River peaks from mid-August to mid-September, with index counts from 1955-2002 averaging about 61,000 spawners (Morstad 2003)." This document, as written, downplays the importance of this drainage. The Gibraltar Drainage (System) is highly productive for sockeye salmon. These index counts are based on aerial surveys and represent approximately 18% of the actual abundance. This should be described otherwise this document underrepresents the actual use of this system by sockeye salmon. The largest aerial survey recorded in the Gibraltar River was 397,000 with 489,000 in the Gibralter System in 1960. In 2010, the aerial survey estimate was 292,000 in the Gibraltar River and 462,800 in the Gibraltar System.	Recommend adding additional information provided to accurately document the significance of the Gilbraltar River and Drainage. Given the productivity of this system it warrants detailed studies similar to what has been done on Upper Talarik Creek.
Chapter 3: Affected Environment	Section 3.24.3.2	page 3.24-35	The Nushagak drainage, which includes the NFK and SFK, supports the largest run of Chinook salmon in the Bristol Bay watershed, with annual escapements averaging about 80,000 fish (Brookover et al. 1997; ADF&G 2018w).	Unclear why an annual report from 1997 is being cited when there are more current versions. The Nushagak Chinook "count" generated from the Sonar site is an index. It is not a count or an estimate of the escapement. The 2008-2017 average "count" is 84,680. This index represents 45-55% of actual king salmon escapement based on hydroacoustic study conducted.
Chapter 3: Affected Environment	Section 3.24.3	page 3.24-4	Pacific salmon spawning and rearing habitat in the mine site is considered limited and low value due to the physical habitat characteristics.	This comment is not quantitative. Limited and low value compared to what? All of Bristol Bay for all salmon? This only addresses the mine site, what about the area in these streams below the mine site that will be dewatered by capture? This needs to be discussed and salmon habitat needs to be considered by species as this area is much more important for king salmon.
Chapter 3: Affected Environment	Section 3.24.4.4	Page 79	"Aerial counts have shown wide annual and spatial variability, with index estimates for Woody Island (for example) ranging from 500 spawners in 1963 to over 194,000 fish in 1970."	The aerial survey estimate for Woody Island in 1965 was 607,500. The range should be reported as a low of 500 in 1963 to a high of 607,500. Should include how many years this range is based on. Is it '63 to '70 or longer than that? The next sentence in this section has the same problem. The document stated the high and low values, but no indication of how many years were examined. "Index counts along Knutson Bay's shoreline have ranged from 1,000 fish in 1990 to 1,000,000 in 1960." Are these index counts from 1960 to 1990 or are they from a longer time series? The document should include the actual range of years used to develop these ranges.
Chapter 3: Affected Environment	Section 3.24.4.5	Page 84	"Alternative 1 would include a north ferry terminal just west of the UTC mainstem outlet to the lake"	Figure 3.24-19 depicts the Alternative 1 North Ferry Terminal to the east of Lower Talarik Creek. Please provide an estimated distance from this ferry terminal to the mouth of Lower Talarik Creek.
Chapter 4 Environmental Consequences	Section 4.6	Page 4.6-2	"In Cook Inlet, impacts on fisheries would be in the form of potential disruption of traditional fishing practices and locations (e.g., groundfish fisheries, salmon fisheries in the Chenik subdistrict)…"	Include the Cottonwood subdistrict along with Chenik given that a port at Diamond Point would disrupt the seine fishery targeting chum salmon there. Likewise, add the Cottonwood Creek subdistrict to the sentence at the bottom of this page.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4: Environmental Consequences	Section 4.6.3.1	page 4.6-9	Crew members, permit holders, processors, and local municipalities are all dependent on the total value of the Bristol Bay fishery, which is a function of market price and harvested volume. When permit holders harvest fewer fish, the net result is that permit holders receive less net income, crew members are paid less, processors have less product to sell, and municipalities have less economic activity to tax.	This section talks about the department adjusting escapement goals because of lost productivity due to the mine and then also says there would be no measurable effect from the mine. This section does not address the mixed stock nature of the commercial fishery as far as different species in the Nushagak District. If the king salmon population is diminished this will result in management actions designed to protect Nushagak king salmon. This will in turn reduce harvest opportunity for sockeye salmon. This could have a significant impact on the commercial fishery.
Chapter 4 Environmental Consequences	Section 4.6.1 Summary of Key Issues	Page 4.6-3	Last sentence of first paragraph in this section suggests Alternatives 2 and 3 avoid impacts to Cook Inlet salmon, scallop and herring interactions. This statement does not consider impacts the Diamond Point port and Iniskin lightering activities would have on commercial purse seiners targeting chum salmon in these areas, nor the value of the Iniskin/Iliamna estuary as a juvenile rearing area for commercially valuable species such as salmon and herring.	Revise narrative to recognize impact Diamond Point port site/Iniskin lightering location would have on salmon fisheries in these areas and potential impacts to commercially valuable species using these locations as juvenile rearing areas.
Chapter 4 Environmental Consequences	Section 4.6.1 Summary of Key Issues	Page 4.6-9 and 10	As noted in a previous comment (Pg 3.6-20), salmon harvest data cited in the PFEIS for the Chenik/Amakdedori subdistrict are incorrect.	Please update this, and all other references in the PFEIS to Chenik/Amakdedori salmon harvest, with the corrected values, which we can provide upon request.
Chapter 4: Environmental Consequences	4.6.3.1	Page 9	Should the projected and actual returns indicate a measurable loss of returning fish during project construction and operations and if the ADF&G does not adjust the escapement goals to account for any lost carrying capacity associated with the project, then the reduction in returning spawners would directly translate into lost harvest opportunities for permit holders in terms of the magnitude of impact. If the ADF&G adjusts the escapement goals for lost carrying capacity, then a portion of lost harvest opportunities would be captured with the adjusted escapement goals, and the remaining portion would transmit to commercial permit holders as lost harvest opportunities.	ADF&G reviews escapement goals every three years and adjusts these goals when data indicates a change in productivity has changed the number of spawners needed to achieve spawners at maximum sustained yield (SMSY). When carrying capacity is reduced through loss of habitat, SMSY is reduced and so it the yield regardless of the whether or not the escapement goal is changed.
Chapter 4: Environmental Consequences	Section 4.6.7	Page 19	"It is clear that changes in the number of returning salmon spawners have a direct effect on the value of the Bristol Bay salmon fishery. The ADF&G is obligated to manage for the long-term health of the resource, which means that if escapement goals remain unchanged, reductions in returning spawners are directly transmitted as lost harvest opportunities."	It is unclear what this statement means. Please provide clarification.
Appendix M Mitigation Assessment	Table M-1	Page M-25	Stream crossing designs should use bridge structures and appropriately sized culverts to maintain hydrology, allow natural stream and river channel processes, and provide passage of all fish species and life stages, whenever possible. Culverted stream crossings should be composed of an arch or oversized culvert at minimum of 120% of the channel width measured at ordinary high water mark. 2. Potential Jurisdiction—State of Alaska.	There may be other federal or local requirements here as well- were they investigated?

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Appendix M Mitigation Assessment	Table M-1	Page M-25	To avoid constricting the natural channel and to allow connectivity of the floodplain, at minimum, stream crossings should meet the USFWS and US Forest Service (USFS) guidelines, which can be found at: https://www.akfishhabitat.org/ and https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsm91_054564.pdf 1. Effective—Potentially, but not supported by the effects analysis. 2. Potential Jurisdiction—State of Alaska. 3. Reasonable—No. This measure is beyond what the ADF&G requires for permitting and approval of culverts. Road culverts would be designed in accordance with best practices and ADF&G guidance at the time of final design. Unlikely.	We did not see any comparison of the effects of stream simulation/ geomorphic analog vs hydraulic design crossing structures in the effects analysis, which is what is being discussed here. This is a well studied field and the benefits of stream simulation/ geomorphic analog structures on stream connectivity is well supported in the literature. This is the current best practice in Alaska, improving passage while reducing maintenance requirements as well as damage to infrastructure from flooding, icing etc. Secondarily, ADFG does not have formal design criteria or guidelines, the linked documents are guidelines; therefore it is incorrect to state design guidelines are "beyond what the ADFG requires" . If the FEIS means to state that installing stream simulation is beyond the requirements of ADFG that is also incorrect as ADFG does not have any formal design criteria.
Appendix M Mitigation Assessment	Table M-1	Page M-27	Streambank restoration should incorporate bioengineering techniques (e.g., root wads, bundled water-tolerant willows), where possible, to maintain natural velocities, prevent bank erosion, and promote healthy riparian system functions that are important to aquatic species	Bioengineering techniques should follow those outlined in the Streambank Revegetation and Protection: A Guide for Alaska where possible.
Appendix M Mitigation Assessment	Table M-1	Page M-27	Streambank restoration should incorporate bioengineering techniques (e.g., root wads, bundled water-tolerant willows), where possible, to maintain natural velocities, prevent bank erosion, and promote healthy riparian system functions that are important to aquatic species	Guidlines for pervention of invasive species introduction during project revegetation activities should be incorporated into the project's Invasive Species Management Plan.
Chapter 4: Env Consequences	Section 4.24	4.24.35	Potential impacts on fish passage are not expected to occur at stream crossings, except temporarily during construction...	This is potentially inconsistent with statements in Appendix M stating that stream simulation type designs or any kind of channel spanning structures are unlikely to be installed. The alternative is structures that are undersized relative to the channel which are well understood to potentially impede the passage of Pacific salmonid species and other fish and aquatic organism either upon installation or after some time has passed. Stream simulation or aquatic organism passage designs were developed specifically to ensure unimpaired passage of all lifestages and species of fish and other aquatic organisms as well as sediment and high flows. If a hydraulic method is used to design culverts, it by definition limits passability to only the species and lifestage modeled for. Any modeling parameters are not discussed.
Chapter 4: Env Consequences	Section 4.24	4.24.35	Culverts and water diversion projects would be designed to facilitate juvenile and adult fish passage (e.g., fish bypass systems) as per permit stipulations. The duration of impact would be that unimpaired passage of fish may be temporarily interrupted during construction activities, but would resume unimpeded after construction is complete. Implementation of BMPs would minimize the magnitude of impact on fish migration resulting from such disturbances.	This statement is inconsistent with Statements in Appendix M stating that stream simulation or, at a minimum, channel spanning structures are unlikely to be installed at stream crossings.
Chapter 4: Env Consequences	Section 4.24	4.24.35	"functional changes to habitat are not expected"	Functional changes to habitat are inevitable if culverts are not designed to accommodate large flows and sediment transport as deemed unlikely in Appendix M.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4: Env Consequences	Section 4.24	4.24.21	"NFK Tributary 1.190 mainstem and sub-tributary stream channels would be blocked by the seepage collection pond dam, and would not be accessible to anadromous fish migrating upstream. Resident species may continue to use stream channels that provide suitable habitat that are blocked to fish passage, but not dewatered as spawning and rearing habitat."	Please identify project areas that resident fish are expected to inhabit above fish barriers constructed by the project.
Chapter 3: Affected Env	Section 3.24	3.24.69	Table 3.24-13, 14 etc.	Tables should show extent of upstream habitat associated with each culverted crossing as that is the best measure of potential impacts to fisheries resources if passage is impeded.
Chapter 3: Affected Env	Section 3.6.3.1	Page 3.6-32	The Mulchatna River, which eventually flows into the Nushagak River, is the only system in Area T known to be directly connected to the project area via surface waters (of the Koktuli River); the river accounted for 6.4 percent of estimated angling effort in the 20 years between 1997 and 2016. However, average annual angling effort on the Mulchatna River was 45 percent lower from 2007 to 2016 than it was from 1997 to 2006 (Table 3.6-10).	While effort levels are relatively low on the Mulchatna and Koktuli rivers, these fisheries may not be properly represented by percentage of total angling effort. The Mulchatna and Koktuli rivers are 2 of a subset of tributaries to the Nushagak that lend themselves to "Float-Trip" angling wherein anglers are dropped off in the upper reaches of a river and float down with rafts while camping and angling along the way. River morphology, remote location and presence of good fishing for resident and anadromous species make these rivers popular as "Float-Trip" destinations.
Chapter 3 Affected Environment	Section 3.1	Pages 1-9	DEIS assumes that subsistence data trends are relatively unchanging over time but with recent changes to the Mulchatna Caribou herd, for example, subsistence activities may have changed substantially between the 2004 & 2005 comprehensive surveys conducted by ADF&G	As stated in previous reviews, the systematic gathering and analysis of harvest use patterns, traditional ecological knowledge and sharing networks should be updated to establish an accurate baseline before the project begins and potential impacts are made.
Chapter 3 Affected Environment	Table 3.1-2 Data Gap Missing Information Screening	Pages 8-9	Assumption that use will follow historic trends	With recent changes in wildlife populations coupled with other environmental change, this assumption may be incorrect. Systematic, current baseline data may likely identify subsistence use response to resource availability changes
Chapter 3 Affected Environment	Table 3.1.3 Resource Interrelationships	Page 6	Changes in resource use	Without more recent study, it is unknown how subsistence harvest is changing from one resource to another due to changes in resource populations
Chapter 3 Affected Environment	Section 3.1.4 Traditional Ecological Knowledge	Page 7	Important areas, access routes, and seasons of subsistence activity, use and sharing of subsistence resources, and changes over time.	Subsistence recently published new information regarding sharing. Technical paper 459 Subsistence Salmon Networks in Select Bristol Bay and Alaska Peninsula Communities, 2016 should be reviewed regarding the vital role sharing has in these communities.
Chapter 3 Affected Environment	Section 3.9 Subsistence 3.9-1	Page 1	2011 reference	A 2016 reference is now available. See comment above re: Technical Paper 459
Chapter 4 Environmental Consequences	4.9.3.1 Changes in Resource Availability	Page 4	Contamination concerns	Contamination concerns may extend beyond waterfowl to other resources. Mitigation, research and outreach regarding contaminants is needed for the life of the project to minimize impacts to subsistence harvest.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Chapter 4 Environmental Consequences	4.9.3.1 Changes in Resource Availability	Page 5 & 6	Statement, "would likely need to make some adjustments to where they harvest"	This will likely have economic impacts to subsistence users that may be unaffordable and prohibitive. Mentions of cost impacts should be moved from page 7 to page 5
4.24 Fish Values	Overall	Overall	The PFEIS states there will be the following impacts to aquatic habitat, water quality, and stream channels, yet impacts to fish populations are not expected: -Habitat will be lost. -Overall stream productivity will be lower. -Increased sedimentation and trubidity would last through the life of the mine. -Changes to surface water temperatures, nutrients, and water qaulity are expected. -Loss of macroinvertebrate production. -Surface and groundwater changes are expected to change, but degree is uncertain. -Impacts to fish, including displacement, injury, and mortality are anticipated. -Uncertainty exists, and degree of impacts are not entirely known. -Fish migration impacts will occur.	EIS should better define metric used to determine level of impacts.
4.24 Fish Values	Table 4.24-1	4.24-3	Permanent removal (direct impact) is listed for affected streams, but there is no mention of indirect impacts from reduced stream productivity downstream as a result. If productivity is removed from headwater areas, there will be less drift, less primary production, less nutrient cycling, less terrestrial inputs and less productivity downstream overall. When the natural flow regimes are altered in headwater streams, the water quality downstream may change.	Indirect loss of stream productivity from the loss of headwater streams and their ecological function should be listed as a key issue in the table.
Sec 4.24 Fish Values	4.24.3.1	4.24-9	Loss of wetlands caused by mine site footprint has been removed from this section. Wetlands provide habitat for fish both directly and indirectly and should be detailed here.	Loss of wetlands at the mine site will impact water quality functions which impacts the quantity and quality of fish habitat. Some of these wetlands provide habitat directly to fish. Loss of wetlands that affect fish habitat should be accounted for in this section.
Sec 4.24 Fish Values	4.24.3.1	4.24-10	The PFEIS incorrectly states that, "The substrate and physical characteristics of the tributary (NFK 1.190) are likely not suitable for spawning salmon, as discussed in Section 3.24..." -From Section 3.24: 'Headwater tributary 1.190 supports anadromous fish habitat, including spawning for coho salmon (p. 3.24-15). - According to the previous sentence in the same paragraph (p. 4.24-10), coho salmon have been documented spawning in this tributary. - Multiple other references in this PFEIS to adult or spawning salmon in the tributary (NFK 1.190), like Table K4.24-1. - Stream is listed in ADF&G AWC as providing spawning habitat for coho salmon.	Claim that "The substrate and physical characterisitcs of the tributary (NFK 1.190) are likely not suitable for spawning salmon..." is not supported by studies or surveys. Aerial surveys routinely undercount fish, especially in smaller streams, and combined with limited surveys, the actual number of adult salmon in the stream may be a low estimate and this should be acknowledged in the FEIS.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Sec 4.24 Fish Values	4.24.3.1	4.24-12	The PFEIS states that spawning and overwintering habitat would remain largely unaffected due to groundwater input. This is partially based on the instream flow and groundwater modeling results which show a large range of potential changes and contain a degree of uncertainty. The conclusion that habitat will be unaffected is less certain than the document suggests.	Groundwater and streamflow interactions are complex and dependent on multiple factors. Large landscape-scale alterations of the topography, water extraction, diversions, and other mine components and operations could alter groundwater patterns differently than modeling suggests, this is why the models have a degree of uncertainty associated with them. For example, the GW model suggests that GW input to the pit post-closure could be between 600 and 4,300 gpm. The uncertainty of the model and the complexity of the GW complex should be considered and incorporated into the conclusion reached that spawning and over-wintering habitas would be largely unaffected.
Sec 4.24 Fish Values	4.24.3.1	4.24-13	The PFEIS states that for some species, reduced stream flow will increase habitat suitablitity (as measured in acres). Slower water velocities are used as rationale. Landscape alterations, roads, vegetation removal and development in general cause increased runoff and sharper spikes in hydrographs. This effect could potentially offset any "benefit" from reduced flows by juvenile fish when they are subjected to artificially higher peak flows. Furthermore, flows in most NFK and SFK stream reaches during the months of January to April are expected to increase, some more than 100% of baseline, therefore increasing stream velocities when juvenile fish are conserving energy. This time period is a critical rearing period for juvenile salmonids. Increased flows during this period will increase water velocities and, by the same rationale used above, reduce habitat suitability. Suitable winter rearing habitat is often a limiting factor in stream production for salmon and the loss of habitat suitability in the winter could offset the benefit of increased suitability during the summer. Flows are expected to increase (some as much as 110%) in all three drainages for January through April (critical overwintering period).	The statement that reductions in streamflow would result in predicted increased habitat (more suitable acres), particularly for juvenile life stages is reached based on a simplistic view of the system, a model with uncertainty, and it isn't clear if the seasonal needs of juvenile fish or increased runoff and hydrograph spikes from landscape development are considered. The analysis should include more explantion of these complex factors and breakdown suitablity by month or season. Predicted quantitiy of suitable juvenile rearing habitat by species (Table K4.24-2) should include monthly or at least seasonal estimates of predicted habitat not just for the entire year as juvenile fish habitat preference changes with the seasons.
Sec 4.24 Fish Values	4.24.3.1	4.24-13	The PFEIS states that for some species, reduced stream flow will increase habitat suitablitity (as measured in acres). The rationale used is that slower water velocities are preferred habitat by juvenile salmonids. This explanation does not hold consistent for different stream reaches and flows. For example, during mine operations SFK-C is expected to see an annual change of -1.7% (loss) mean monthly flow and an increase of rearing habitat by 9.2%. After operations (closure) this same stream reach is expected to see an annual change of +17.3% (gain) mean monthly flow and an increase of rearing habitat by 7.4%. So, less water equals more habitat and more water also equals more habitat in the same stream reach. More importantly, are these flows within the normal range for the corresponding month? Additionally, changes to streamflow and predicted suitable habitat cannot be compared for some of the reaches because not all are included in the tables.	Reconcile discrepancies or provide further explanation why sometimes reduced flows means more rearing habitat and other times increased flows means more rearing habitat. Consider rearing habitat in the analysis by seasons or months to encompass critical overwintering periods. Need more explanation and breakdown of changes in streamflow and the impact on habitat suitability, including critical overwintering periods. Seeing minimum and maximum flows or the 80th and 20th percentile of flows would be helpful to understand if these thresholds are being exceeded. In other words, showing that the changes to streamflows are within the range of flows for each month would be helpful to determine impacts to fish and aquatic habitat. Include all stream reaches in tables showing changes to streamflow and predicted quantities of spawning and rearing habitat.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Sec 4.24 Fish Values		4.24-15 Figs. 4.24-2 and 4.24-4	Figures do not include tributary streams appearing to under represent the magnitude of decreased habitat.	Correct Figure 4.24-2 and -4 to show all decreased values for suitable spawning and rearing habitat.
Sec 4.24 Fish Values		4.24-15 Figs. 4.24-2 and 4.24-4	Figures do not include tributary streams appearing to under represent the magnitude of decreased habitat.	Correct Figure 4.24-2 and -4 to show all decreased values for suitable spawning and rearing habitat.
Sec 4.24 Fish Values	4.24.3.1	4.24-23	*Impacts to habitat are concluded with certainty when uncertainty exists.* The PFEIS states that groundwater (GW) influences in the reach below NFK WTP outfall will attenuate higher surface water temperatures caused by treated water discharges. It is also stated in this section that existing GW temperatures range from 2.8-3.6 C. and that winter surface water temps are around 0 C suggesting that existing GW input isn't affecting surface water temperatures to the degree that would attenuate the increased water temperatures due to WTP discharges.	The statement that GW will attenuate unnaturally higher surface water temperatures and that NO impacts to incubating eggs or alevin is expected is not supported by field studies and should be correctly described as unknown. The GW may not attenuate the surface water to the degree assumed and incubation and hatching times may be increased. It would be more correct to state that there is uncertainty regarding impacts to incubating eggs and alevin from increased water temperature discharges during winter months and that impacts could occur. This also applies to the SFK and UTC albeit to a lesser degree since temperature increases are less dramatic.
Sec 4.24 Fish Values	4.24.3.2	4.24-26	Impacts and potential effects of stream crossings isn't fully considered. Crossing structures and road fill will directly impact 3.5 acres of stream habitat. This loss of habitat will be permananent, lasting as long as the road. The PFEIS only recognizes the distrubance from construction when listing the duration of impacts (short-term to temp.). Free passage of fish after construction is assumed. This may be true most of the time, but even properly designed culverts need maintenance and can get blocked or damaged impeding fish passage. large numbers of culverts will be placed in streams and it is reasonable to assume that maintenance will be necessary through the life of the project.	The duration of impacts from direct habitat loss at stream crossings should be listed as permanent. The potential impact of fish passage being blocked at stream crossings should be considered. Large rain events are not uncommon in the area and combined with heavy loads over culverts, remote setting, and repair/replacement considerations, the potential for temporary fish passage interuptions exist for the life of the project and should be included.
Sec 4.24 Fish Values	4.24.3.2	4.24-26	The PFEIS states that adult spawning does not occur at the Eagle Bay ferry terminal. However, surveys during spawning time were limited to a couple of flights during one season and one snorkel survey. Paradox 2018 noted hundreds of adult salmon along the shoreline at the Eagle Bay site and snorkel surveys detected sediment disturbance and round areas cleared of fines by sockeye salmon that were not observed by the helicopter surveys. The authors concluded these were indicators of spawning in the area later in the year and labeled them signs of potential spawning.	One year of limited surveys in the area of the Eagle Bay ferry terminal showed signs of potential spawning later in the year (Paradox 2018) but the PFEIS definitively concludes that there is an absence of adult spawning at the terminal locations. Limited surveys and indicators of potential spawning after survey timing create uncertainty as to the use of sockeye salmon spawning near the ferry terminals. Salmon may shift spawning areas from year to year. The PFEIS should acknowledge the limited surveys and indicators of potential spawning and subsequent uncertainty and not definitively conclude an absence of adult spawning - maybe state that limited surveys did not observe spawning from the air, but potential indicators of spawning were observed on the ground or just state that limited surveys did not observe spawning.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Sec 4.24 Fish Values	4.24.3.2	4.24-28	The PFEIS lists direct impacts to fish as noise and vibration during backhoe use to install culverts and bridges and vibration and noise from traffic on the bridges, but there is no mention of direct impacts from pile driving in streams. Temporary trestle bridges and in-stream piles are proposed for the project.	Pile driving for bridge piers and temporary trestles should be included and analyzed as a potential impact to fish and fish eggs.
Sec 4.24 Fish Values	4.24.3.2	4.24-29	Blasting is planned along the road corridor and at material sites. The PFEIS simply states that guidelines will be followed to protect fish. However, following the guidelines may not always be possible and being guidelines, even if followed they may not always be protective.	Include and analyze potential impacts on fish and fish eggs from blasting along the road corridor and at material sites.
Sec 4.24 Fish Values	4.24.3.2	4.24-34	Roads and associated stream/wetland fill are a source of sedimentation for the life of their existence regardless of BMPs, inspections, and permit conditions. Sedimentation and turbidity impacts at stream road crossings is considered temporary, during bridge and culvert installation. Roads at stream crossings, especially unpaved roads, are a long-term source of sedimentation and turbidity that occurs after construction for the life of the road. It is well documented that roads contribrute sediment to streams during the entire life of the road not just during construction. Road-stream crossings are the most frequent sources of erosion and sediment (Rothwell, 1983) and impacts can be dramatic and long-lasting (Meehan, 1991). In fact, on p. 4.24-33 the PFEIS states that the access roads could result in increase erosion and sedimentation and increase flows and the duration of impacts would be permanent.	Sedimentation and stream turbidity impacts should be considered at stream crossings for the life of the project.
Sec 4.27 Spill Risk	4.27.8.3	4.27-83	Impacts to streambank habitat, riparian vegetation, and hydrogeomorphology are not considered from a large tailings release. A large release of sediment laden water to a waterbody could erode streambanks, destroy riparian vegetation, cause channel evulsion, and alter the stream channel type of a reach of stream. Channel degredation/alteration, streambank destabilization, and loss of riparian habitat may take years to recover.	The long-term population and production impacts from chronic sedimentation due to destabilized banks, channel evulsion, and stream type degredation caused by a large, unnatural flood event should be considered. Recovery could potentially take years for the channel to adjust and streambanks restabilize.
Chapter 2 Alternatives	Section 2.2.4.4	Page 2-82	PFEIS states that pipeline will be trenched to transition out of the western shore of Cook Inlet.	The PFEIS should go into further detail on specifics of nearshore pipeline trenching and installation activities as the pipeline transitions onshore in tidally influenced areas of Cook Inlet in order to better assess potential impacts.
Chapter 2 Alternatives	Section 2.2.4.4	Page 2-8	PFEIS, in this section states that pipeline wil be trenched to transition in and out of Lake Illiamna.	In Section 4.24 Fish Values, it states that the pipeline would use Horizontal Directional Drilling (HDD) and trenching to install the pipeline in Iliamna Lake. PFEIS should analyze both methods. Lake Iliamna is an anadromous waterbody and any work in the lake will require a Title 16 Permit from ADF&G.
Chapter 2 Alternatives	Section 2.2.4.4	Page 2-82	PFEIS states "Surface roughness along a 0.6-mile section of the Iliamna Lake pipeline segment would require building a permanent berm to place the pipeline on."	A permanent berm constructed in Iliamna Lake was not included in previous versions of the DEIS. The PFEIS should go into more specifics on how the permanent berm will be constructed, imported materials used, and general locations in order to better assess potential impacts. The PFEIS should also describe how/if the pipeline will be anchored to the permanent berm as well as potential consequences if it drifts off the berm due to lateral movement to better assess potential impacts.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Section 4.14 Soils	Section 4.14.3.4-Natural Gas Pipeline Corridor	Page 4.14-21	Section does not describe the potential soil disturbance or erosion from stand alone pipeline installation or transition trenching areas for Lake Iliamna or Cook Inlet.	Section should describe construction induced erosion from all aspects of pipeline installation and operations including open-cut stream crossings, trenching in Cook Inlet and Lake Illiamna, exposed trench spoils, overland flow interception of pipeline trench and overburden, pipeline hydrostatic testing water disposal and potential frost heaving post construction in order to fully assess potential impacts.
Section 4.14 Soils	Section 4.14.3.4	Page 4.14-22	PFEIS states "Available erosion control measures and BMPs with stand-alone pipeline construction were detailed above." yet they are not detailed.	PFEIS should detail the available erosion control measures and BMPs associated with stand-alone pipeline construction.
Section 4.16-Surface Water Hydrology	4.16.4.6 Natural Gas Pipeline Cooridor	Page 4.16-44	Iliamna Lake section only describes suspended sediment concentrations in the water column due to pipeline trenching activities.	Iliamna Lake section should also include impacts from the proposed 0.6 mile underwater permanent berm recently included in this version of the EIS.
Section 4.18 Water and Sediment Quality	4.18.4.4 Natural Gas Pipeline Cooridor-Surface Water Quality	Page 4.18-32	Section states “The magnitude, extent, duration, and likelihood of impacts to surface water quality within the natural gas pipeline corridor would be associated with installation of the pipeline at water crossings and the use of local water sources for hydrostatic testing.”	The magnitude (extent) of surface water quality impacts from the natural gas pipeline would be associated with more than just these two aspects of pipeline construction. The EIS should identify and evaluate all potential impacts on surface water quality including: trenching in Cook Inlet and Lake Illiamna, underwater berm construction, interception of overland surface flows by the pipeline ditch, release of hydrostatic waters, erosion and sedimentation from exposed trench spoils and frost heaving.
Section 4.18 Water and Sediment Quality	4.18.4.4 Natural Gas Pipeline Cooridor-Surface Water Quality	Page 4.18-32	Section states “Impacts (pipeline) at material sites and stream crossings would be the same as those described above for the transportation corridor.”	Stream crossing impacts would be different for many aspects of the stand alone section of pipeline construction such as open cut trenching and overland access since the pipeline would not be buried in the road prism. Also, it is unclear why “material site” impacts are included in pipeline section. Consider re-wording this sentence in the pipeline section and addressing pipeline related water quality impacts from the stand-alone pipeline section, specifically open cuts across streams and equipment access without an access road.
Section 4.23 Wildlife Values		Page 4.23-1	Section states "Temporary impacts (wildlife habitat) were related primarily to the installation of the natural gas pipeline."	While the proposed pipeline is a significant component of the project as a whole, it is unclear how this would be the primary source of temporary wildlife impacts particularly since most of the terrestrial portion of the pipeline would be buried in the road prism. PFEIS should explain why the installation of the pipeline is the primary source of temporary wildlife impacts or reword the statement.
Section 4.24 Fish Values	4.24.3.2 Transportation Corridor and natural Gas Pipeline Corridor-Iliamna Lake-Ferry Terminals and Natural Gas Pipeline	Page 4.24-27	Section describes effects from pipeline trenching and HDD as well as pipeline installation sequencing but does not describe the newly added .6 mile permanent underwater berm proposed in some sections of Iliamna Lake.	PFEIS should detail the construction methods for the newly proposed underwater .6 mile berm as well as its potential impacts to fish and benthic invertebrates.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Section 4.24 Fish Values	4.24.3.2 Transportation Corridor and natural Gas Pipeline Corridor-Cook Inlet Portion of Natural Gas Pipeline	Page 4.24-27	Section only describes impacts from HDD into Cook Inlet and laying the pipeline on the bottom of Cook Inlet but it does not address the impacts from trenching out of Cook Inlet.	Section should also describe the impacts from trenching the pipeline out of Cook Inlet.
Section 4.24 Fish Values	4.24.3.2 Transportation Corridor and natural Gas Pipeline Corridor-Displacement, Injury, and Mortality of Fish and Benthic Organims-Trenching and HDD	Page 4.24-29	Section states "Fish could be directly impacted (smothered or buried) by the loss of HDD drilling fluid through subsurface fractures (frac-out)."	Statement should clarify that loss of HDD drilling fluids could smother or bury fish eggs. It is highly unlikely that a fish would be buried or smothered as a result of high turbidity from a frac-out. Prolonged exposure of released drilling muds over a fish redd (nest) could clog interstitial spaces in the gravel and impede oxygen uptake by buried eggs.
Section 4.24 Fish Values	4.24.3.2 Transportation Corridor and natural Gas Pipeline Corridor-Displacement, Injury, and Mortality of Fish and Benthic Organims-Overland Natural Gas Pipeline Construction	Page 4.24-32	Section states "The final configuration of the natural gas pipeline would generally be in the prism of the access road."	Section should also address the stand-alone section on pipeline that is not buried in the road prism as well.

Document Name	Section/ Figure/ Table	Page No.	Comment/Issue	Recommendation/Action
Section 4.24 Fish Values	4.24.3.2 Transportation Corridor and natural Gas Pipeline Corridor-Displacement, Injury, and Mortality of Fish and Benthic Organisms-Iliamna Lake—Ferry Terminals and Natural Gas Pipeline	Page 4.24-33	Section states "HDD would be used to install the natural gas pipeline segments from the lakeshore into waters deep enough to avoid navigational hazards, then laid and secured on the lake bottom."	Other sections of the PFEIS indicate that the pipeline would be trenched into Lake Iliamna. Section should evaluate both methods as well as impacts from transitioning out of Lake Iliamna.
References:				
Rothwell, R. L. 1983. Erosion and Sediment Control at Road-Stream Crossings. The Forestry Chronicle. April 1983				
Meehan, W. R. 1991. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19.				
Maret, T., D. Cain, D. MacCoy, and T. Short. 2003. Response of benthic invertebrate assemblages to metal exposure and bioaccumulation associated with hard-rock mining in northwestern streams, USA. Journal of the North Amer				
Kravitz, M., and G. Blair. 2019. On assessing risks to fish habitats and populations associated with a transportation corridor for proposed mine operations in a salmon-rich watershed. Environmental Management.				
Paradox Natural Resources. 2018. Memorandum: Summary of 2018 Surveys of Adult Sockeye Salmon in Iliamna Lake. Jeff Barrett author. September 20, 2018.				

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
Chapter 4, Section 4.1 Environmental Consequences		4.1-6	The page states that the State of Alaska constructed the Delong Mountain Transportation System. It should be clarified that the Alaska Industrial Development and Export Authority (AIDEA), a public corporations created in 1967 by the Alaska legislature built that road.	Please clarify.
Chapter 4, Section 4.4 Environmental Justice		4.4-11	Paragraph two, sentence three on this page proposes that concentrations of HAP and non-HAP metals in soils would be indistinguishable from current baselines and would not result in new exceedances. This may not be a correct assumption. For example with arsenic, anthropogenic (man-made) exceedances are treated differently than natural exceedances.	Please clarify.
Chapter 4, Section 4.4 Environmental Justice	Table 4.4-2	4.4-20	The discussion of the Pebble Project Expansion scenario does not provide details on impacts to wetlands, but appears to focus on potential beneficial impacts.	Provide additional information on impacts to wetlands or a citation to where the information can be found.
Chapter 4, Section 4.17 Groundwater Hydrology		4.17-2	Text on this page notes that "*groundwater use would be highest during construction and operations, and is expected to recover to pre-mining levels once reclamation occurs during closure.* " Please reword. DEC believes this statement means to say that groundwater flows are expected to recover. Groundwater use would decrease once reclamation occurs.	Please clarify and/or edit.
Chapter 4, Section 4.20 Air Quality		4.20-7	The final paragraph on this page notes that "The federal Class I status is assigned to federally protected wilderness areas and allows for the lowest amount of permissible deterioration." Please note that not all federally protected wilderness areas are considered Class I areas. A list of the Class I areas can be found in Table 1 at 18 AAC 50.015(c)(2).	Please revise the text to clarify which areas are designated as Class I areas in Alaska.
Chapter 4, Section 4.20 Air Quality		4.20-24 thru 4.20-25	The analysis of the Pebble Expansion Scenario ~~also ignores~~ appears to discount potential effects from combined emissions by noting " The potential for regional cumulative air quality impacts would be minimal and localized to the Pebble Expansion activities."	Please provide justification or information in support of this proposed conclusion.
Chapter 4, Section 4.22 Wetlands		4.22-9	The final paragraph on this page notes "A fugitive dust control plan, identifying project design features and best management practices has been developed by the applicant. (PLP 2019 - RFI 134)." Please not that this is a conceptual plan and should not be considered as a mitigation measure.	Either develop a more detailed plan or remove references to the fugitive dust control plan as a mitigation measure.

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
Pebble PFEIS Appendix D	Comment Analysis	D-130	*Statement of Concern: The DEIS stated that the mine site would be in Alaska Department of Natural Resources Bristol Bay Area Plan (BBAP) Region 6; specifically, R06-23 and R-06-24. Commentors noted that the bulk TSF would aslo be in R06-30 and R06-05, and asserted that not all of Region 6 is designated for minerals development.*	The Department of Natural Resources (DNR), Division of Mining, Land & Water (DMLW), Resource Assessment & Development Section (RADS) reviewed the mine footprint as it relates to the units of the revised (2013) Bristol Bay Area Plan. Please see the attached maps depicting the mine site in relation to the BBAP unit boundaries. The mine footprint is mostly in units R06-23 & R06-24, however it does extend into units R06-05 and R06-30. Units R06-23 & R06-24 are designated Minerals (Mi) with the intent for mineral development. Unit R06-05 is designated General Use, with the intent to be managed for a variety of uses including mineral development. Unit R06-30 is designated Public Recreation (Rd) and Wildlife Habitat (Ha), with the intent to be managed for recreational uses. Oil, gas and mineral development are considered appropriate if consistent with the management objectives or if in the best interest of the state.
Chapter 5: Mitigation & M1.0 Mitigation Assessment	Table M-1: Assessment of Mitigation and Monitoring Measures Identified During the EIS Process, Second Row	M-4	Inactive mine sites in the Bristol Bay region could be evaluated to see if they are orphan mine sites with no viable financially responsible party and determine if they provide mitigation opportunities. Additional orphan mine sites can be found outside the immediate watershed.	Possible sites in the immediate watersheds surrounding Pebble Mine: State land sites include: Shot, Synneva (Scynneva) Creek, and Bonanza Creek. Federal land sites include: Red Top, Unnamed (near tributary to Arcana Creek) and Monk's Hood. The above mine sites are a mix of hard rock and placer mining.
Chapter 2 Alternatives	Footnote 1	2-1	The footnote on page 2-1 regarding the expansion scenario is appreciated. Similar clarifications that the expansion scenario would require additional review under NEPA would also be informative to the public.	Consider adding similar clarification throughout the FEIS and ROD that additional review under NEPA is required prior to construction of the expansion scenario.
Ch 2 Alternatives	2.2.4.5-Alt 3, Transportation Corridor	2-140	Lined concentrate pipelines cannot be built as a continuous welded segment over the entire length, because the tight-fitting HDPE liner would need to be pulled through the inside of the steel pipe. Welded segments can be up to 2,000 to 2,500 feet in length, typically allowing for river crossings that do not include flange connections.	The FEIS should describe considerations that would be made to allow for repair of damaged sections of the pipe or lining. The FEIS should also describe how potential scour damage in the HDPE liner, which could allow corrosion of the steel casing pipe, would be monitored or detected.
Ch 2 Alternatives	2.2.7.5 Alt. 3, Transportation Corridor	2-144	The concentrate pipeline and water return would be buried in the trench with the gas pipeline "with approximately 36 inches of cover, or deeper in areas where needed to prevent freezing" and "at major stream crossings, the pipeline would be attached to the vehicle bridges" Water pipelines buried below frost line (roughly 8' in the Anchorage area) have protection from freezing, but where the pipes are above ground (valves, bridges, buildings, etc.), they may need additional protection from freezing.	Please clarify that the concentrate pipeline and water return would be protected from freezing wherever necessary along its entire route.
4.1 Environmental Consequences	Table 4.1-2	4.1-24 to 4/1-25	Preferred Alt and Alt 1 - "after 20 years, an additional natural gas compressor would be built at Amakdedori" and "less overall truck traffic with concentrate and diesel transported via pipeline from Iniskin" (likewise in regards to Diamond Port for Alt 2 & 3)	No explanation is given for why an additional gas compressor is needed in addition to the construction of the diesel pipeline at Iniskin (or Diamond Port for Alt 2 & 3).

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
4.1 Environmental Consequences	Table 4.1-1	4.1-15 to 4.1-16	Drift River: "proposes to repurpose an existing natural gas pipeline crossing Cook Inlet to an oil pipeline. Involves the installation of 9 miles of new cross-inlet between Beluga and Nikiski."; Status - "Decommissioning of Drift River initiated in 2017..." The new gas pipeline from Beluga to Tyonek platform was completed in fall 2018. Converted gas pipeline (CIGGS-A) is now transporting oil eastward across Cook Inlet (fall 2018), which will allow for the decommissioning of the Drift River Terminal.	Please update the FEIS accordingly. Relevant information about Drift River and Cook Inlet pipelines can be found at: https://www.alaskajournal.com/2018-10-25/hilcorp-replaces-tankers-cross-inlet-pipeline-project. https://dog.dnr.alaska.gov/Services/Pipelines?pipeline=Tyonek%20W%2010%20Gas%20Pipeline and https://dog.dnr.alaska.gov/Services/Pipelines?pipeline=CIGGS%20Pipeline
Chapter 4	4.12.2.1	4.12-4	"During construction of the pipeline on the Kenai Peninsula ... traffic on the Sterling Highway would be affected by vehicles transporting materials to the site. The magnitude and extent of the effect would be delays and disruption of traffic due to construction of the project components. However these traffic delays are expected to be less than the usual delays experienced on Sterling Highway during the summer months when tourist traffic at its highest and road construction is most active (PLP 2018-RFI 037). Disruption of traffic may include lane closures and slow vehicles in the immediate vicinity of the construction site. This disruption would be short-term, only occurring during pipeline construction, but the likelihood of occurrence is certain under Alternative 1."	These impacts would depend on when the compressor station and pipeline construction occur. Please clarify what season the project construction would occur. Though its traffic may be less than summer construction traffic, if it would be cumulative with road maintenance traffic, the impact could have greater effects on travelers. Additional traffic on the only major local road may be a significant impact to local transportation.
4.12 Transportation	4.12.3.3, Natural Gas Pipeline Corridor	4.12-11	"and 34 miles crossing on the Iliamna Lake bed"	Other areas of the PFEIS refer to the new lake crossing as a 21-mile crossing of the pipeline. Suggest correcting this number or clarifying why the distance is inconsistent with other document components (such as page 2-82).
4.20 Air Quality	Table 4.20-2, Other Mineral Exploration	4.20-25	"The proposed Donlin Gold Mine would be situated roughly 175 miles northwest of the Pebble expansion scenario. In general, RFFA's associated with mineral development are too far away to influence regional cumulative air quality impacts"	Suggest removing reference to Donlin as it seems too far away to influence cumulative air quality impacts, or explain how it is a contribution to cumulative effects on air quality if it is not too far away.
Ch 4, multiple sections	Natural Gas Pipeline	4.24-27 (also p 4.24-29 and 4.24-33)	The pipeline transitions appear to be inconsistently described in Chapter 4. Section 4.24 (page 4.24-27) says, "(HDD) and trenching from lay barges would be used to install the pipeline segments from the lakeshore into waters deep enough to avoid navigational hazards", but other locations, such as 4.16-44, say "construction of the pipeline by trenching". Executive Summary (page 15) says west Cook Inlet and Iliamna Lake transitions would be by trenching.	Please clarify the apparent inconsistencies. It is probably better to default to "HDD or trenching", since the preferred construction technique could change during final design stages.
4.27 Spills	Table 4.27-3	4.27-155	"Potential diesel and concentrate spills from the pipelines..."	Spill risks from the potential diesel pipeline are not addressed elsewhere in this document. Spill response for diesel pipelines should be planned in advance, and would include pipeline valves at waterbody crossings, contingency response units, and other design features which can increase project footprint and land disturbance.

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
Appendix E	Table E-1	Page E-18	The PFEIS states that "State Pipeline Coordinator's Section issues pipeline ROW **easements**… Commissioner signs the **easements** and… manages the **easements**" (emphasis added)	Pipeline rights-of-way under AS 38.35 are leases rather than easements (the language on page E-17 referencing easements under AS 38.05 is correct). Please change "easement" to "leases" in the description for Right-of-Way Leasing Act (AS 38.35) in Table E-1.
Appendix I	Section 6.8 Pipeline Installation	118	"Inactive pipelines that remain in place, will be properly pigged, purged, **filled with seawater**, and capped" (emphasis added)	This text does not specify whether filling with seawater is intended only for the subsea pipeline components. Suggest clarifying that uplands buried pipeline would not be filled with seawater when/if abandoned in place.

Topic (use drop-down box)	Agency/Department	EIS Chapter	Section/Fig./Table	Page #	Comment/Issue	Recommendation/Action	USACE DIRECTION TO CONTRACTOR (use drop-down box)	USACE COMMENTS	DEC RESPONSE TO CORP
Air Quality	DEC/ Air Quality Division	Chapter 4: Environmental Consequences	4.20	4.20-1 thru 4.20-6	Given the concerns about the emission estimation methods for mobile and non-road equipment listed in the comments, the emission summaries may nor accurately reflect air quality emissions from the proposed project.	Emission summaries and conclusions should be revised as needed to reflect updated emission estimates using appropriate estimation techniques and emission factors.	Comment noted. No change to document needed in response to this comment.		Cumulative impacts of multiple activities need to be combined and analyzed.
Air Quality	DEC/ Air Quality Division	Chapter 3: Affected Environment	3.20.1.3	3.20-7	Paragraph three on this page notes that "However, given that both SO2 and NOX emissions contribute to both visibility impairment and deposition, and knowing that visibility degradation in Denali National Park is slightly worse than Tuxedni, it is expected that deposition measurements in Denali National Park are conservatively representative of Tuxedni and the analysis area." This statement is questionable due to the lack of a defined fugitive dust control plan.	If fugitive dust control will be considered a mitigation measure, **please provide a written plan**, including information regarding which agency would be responsible for compliance and enforcement.	Request information from applicant and adjust analysis in the EIS		Fugitive dust control plan provided is conceptual in nature and cannot be considered a mitigation measure. Please consider adding to the EIS document the following statement: "*Within the limits of its regulatory authority, DEC can require an assessment of ambient air quality to verify whether fugitive dust is causing or significantly contributing to concentrations of particulate matter above ambient air standards*."
Air Quality	DEC/ Commissioner's Office	Chapter 4: Environmental Consequences	4.20.1	4.20-2	Bullet one on this page discusses the duration of impacts to air quality. Sub-bullet one notes that *"the air quality impacts would only remain while the project's activity is ongoing, returning to the baseline conditions once the activity is complete; this would be short-term is occurring only during construction..."* It is not clear how four years of construction activity can be considered "short-term" in the context of air emissions.	Please explain how four years can be considered "short-term" or change the characterization to "medium-term" to reflect the duration of the air emissions.	Modify EIS as recommended by commenter.		Change was not made. Emissions are still described as short-term. No explanation provided.
Air Quality	DEC/ Commissioner's Office	Chapter 4: Environmental Consequences	4.20.1	4.20-7	Paragraph three on this page discusses air emissions related to project closure. The paragraph notes *"If near-field impacts were to occur, they would be minimal in magnitude, localized in extent, and of short-term duration, occurring while closure activities are ongoing."* It is not clear how twenty years of closure activity can be considered short-term.	Please explain how twenty years can be considered "short-term" or change the characterization to "medium-term" to reflect the duration of the air emissions.	Modify EIS as recommended by commenter.		Change was not made. Emissions are still described as short-term. No explanation provided.
Air Quality	DEC/ Commissioner's Office	Chapter 4: Environmental Consequences	4.20.3.2	4.20-11	Paragraph one on this pages discusses air emissions during mine operations. The paragraph notes *"As discussed in the mine site impact analysis, air quality near-field and far-field impacts would be minimal in magnitude, localized in extent and short-term in duration, only occurring during the activity."* It is not clear how twenty years of operations activity can be considered short-term.	Please explain how twenty years can be considered "short-term" or change the characterization to "medium-term" to reflect the duration of the air emissions.	Modify EIS as recommended by commenter.		Change was not made. Emissions are still described as short-term. No explanation provided.
Air Quality	DEC/ Commissioner's Office	Chapter 4: Environmental Consequences	4.20.3.2	4.20-11	Paragraph two on this page discusses air emissions during the closure/post-closure period. The paragraph notes *"If near-field impacts did occur, they would be minimal in magnitude, localized in extent, and of short-term duration, only occurring during closure/post-closure activities."* It is not clear how twenty-plus years of closure/post closure activity can be considered short-term.	Please explain how twenty-plus years can be considered "short-term" or change the characterization to "medium-term" to reflect the duration of the air emissions.	Modify EIS as recommended by commenter.		Change was not made. Emissions are still described as short-term. No explanation provided.

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Air Quality	DEC/ Commissioner's Office	Chapter 4: Environmental Consequences	4.20.3.3	4.20-12	Paragraph three on this page discusses air emissions related to construction of the Amakdedori Port. The paragraph states "*Based on that similarity, the magnitude, extent and duration of air quality impacts would be minimal, localized, and short-term, only occurring during construction activities."* It is not clear how four years of construction activity can be considered short-term.	Please explain how four years can be considered "short-term" or change the characterization to "medium-term" to reflect the duration of the air emissions.	Modify EIS as recommended by commenter.		Change was not made. Emissions are still described as short-term. No explanation provided.
Air Quality	DEC/ Air Quality Division, Air Permitting Program	Appendix K4.20	K4.20.1.2	K4.20-3 and 4	The distance between the project area and the nearest Class I area is approximately 130 km. As stated above, the NOx impacts of the project may be understated due to the omission of mobile source emissions. Therefore, a criteria pollutant impact analysis may be warranted.	Perform Class I Increment analysis, or address the issue of potential impacts more explicitly (if appropriate).	Comment noted. No change to document needed in response to this comment.		Document ignores the combined effect of air emissions from different activities
Air Quality	DEC/ Air Quality Division, Air Permitting Program	Appendix K4.20	K4.20.2.2	K4.20-12	Paragraph 2 suggests that demonstration of compliance with the AAAQS/Increment for the mine site, evaluated alone, implies that the transportation corridor (also evaluated alone) would not cause or contribute to a violation of the AAAQS/Increment due to its lower emissions. This is not a representative approach. The transportation corridor has different emission units, ambient air boundary configuration (if any boundary at all), etc. Therefore comparing the mine site to the corridor is "apples and oranges". Also, the two components are geographically adjacent and will emit pollution contemporaneously, resulting in overlapping impacts. Analyzing both components in isolation will underestimate the cumulative ambient air impacts and is not an appropriate approach.	Conduct a new ambient air quality analysis that includes all sources in the project area that emit pollutants concurrently; or, if already performed, revise this paragraph to better describe the approach.	Comment noted. No change to document needed in response to this comment.		Document ignores the combined effect of air emissions from different activities. Please conduct a new ambient are quality analysis that includes all sources in the project area that emit pollutants concurrently.
Alternatives	DEC/ Commissioner's Office	Draft EIS Executive Summary	3.2.2.3	44	Paragraph three and four on this page notes that "The Pebble Mine expanded development project would impact approximately three times the area proposed under Action Alternative 1, with an expansion into the UTC watershed that Action Alternative 1 generally minimizes. The magnitude of cumulative impacts to water and sediment quality would generally be increased discharges of treated effluent that would be expected to meet permit limits, but the duration of effects would be increased to approximately 98 years." There are other discussions on pages 31, 33 and other pages regarding the "expanded development scenario", but no explanation of how and why it is being discussed as a reasonably foreseeable future action, but not being discussed as an alternative.	It is not clear why the "expanded development project" or "expanded development scenario" is included in this discussion. There do not appear to be detailed discussion of the expanded scenario in Chapter 2, Alternatives or K2.0 Alternatives. Please cite to Chapter 3 discussions of cumulative effects, so the reader can understand the details better.	Comment noted. No change to document needed in response to this comment.		Pebble Mine Expanded scenario is not treated consistently across sections. Please explain consistently.
Cumulative Effects Analysis	DEC/ Commissioner's Office	Chapter 4: Environmental Consequences	4.10.7.2	4.10-14	Paragraph five on this page proposes that direct exposure of the affected communities to hazardous materials may not be noticeably altered by the expansion scenario as long as the cumulative magnitude of all emissions and releases to air, soil and water continue to be less than the appropriate screening levels for human health. It further notes that *"It would be expected that mitigation measures would be used to minimize or mitigate exposure."* Both of these conclusions are predicated on future actions. As noted earlier with the fugitive dust plan, more detail must be provided to support these conclusions or provide a citation to where the information is available.	Please provide additional information that would support the conclusion that cumulative emissions and releases would be less than the appropriate screening levels and additional information on actual mitigation measure that will reduce impacts, not promises of future mitigation efforts.	Modify document as stated in USACE COMMENTS	Support assertion that cumulative emissions would be less than screening levels, reference and incorporate fugitive dust control measures or other known mitigation or if statement cannot be supported, revise analysis to disclose potential impacts.	No additional support provided that cumulative emissions would be less than screening levels. Wording on page 4.10-16 now says "cumulative magnitude of all emissions and releases to air, soil, and water are less than the appropriate screening levels for human health." As noted above since the cumulative emissions of mining, operations and transportation are not considered, this conclusion is unsupported. Please provide support for th assertion.

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Earthquakes or Seismic concerns	DEC/Environmental Health Division, Solid Waste Program	Appendix N	6.1	72	It is not clear if the reclamation and closure plan for the bulk tailings includes detailed static and seismic stability analyses.	Please provide static and seismic stability analysis for the bulk tailings reclamation and closure.	Modify document as stated in USACE COMMENTS	Add discussion on conceptual static and seismic stability analysis.	No apparent discussion in Appendix N. pages 80-82
Fugitive Dust	DEC/ Air Quality Division	Chapter 4: Environmental Consequences	4.20	4.20-10	A fugitive dust control plan from road traffic is not discussed in this section regarding the operations phase of the road corridor. A statement is made "*once construction is complete, air quality would return to baseline conditions.*" This is not true of any unpaved road in continual operation.	Fugitive dust from unpaved roads is of grave concern, especially considering wind conditions near the construction zone. A robust fugitive dust control plan is needed.	Request information from applicant and adjust analysis in the EIS		Fugitive dust control plan provided is conceptual in nature and cannot be considered a mitigation measure. Please consider adding to the EIS document the following statement: "*Within the limits of its regulatory authority, DEC can require an assessment of ambient air quality to verify whether fugitive dust is causing or significantly contributing to concentrations of particulate matter above ambient air standards*."
Fugitive Dust	DEC/ Commissioner's Office	Chapter 4: Environmental Consequences	4.18.3.1	4.18-11	Paragraph two on this page discusses the effects from deposition of fugitive dust and notes that PLP is developing a plan for mitigation purposes.	If fugitive dust control is to be considered a mitigation measure, the applicant must provide a written plan, including information regarding which agency would be responsible for compliance and enforcement. Promising to develop a plan does not qualify as mitigation.	Request information from applicant and adjust analysis in the EIS		Fugitive dust control plan provided is conceptual in nature and cannot be considered a mitigation measure. Please consider adding to the EIS document the following statement: "*Within the limits of its regulatory authority, DEC can require an assessment of ambient air quality to verify whether fugitive dust is causing or significantly contributing to concentrations of particulate matter above ambient air standards*."
Fugitive Dust	DEC/ Air Quality Division	Chapter 4: Environmental Consequences	4.20.3.5	4.20-18	The summer-only variant on this page proposes storing an additional 6-months of ore concentrate on-site and contends there will be no additional impact from fugitive dust. This is not a defensible argument considering the increased size of ore concentrate stockpiles and known wind/weather conditions at the mine site. Storing additional 6-months of ore concentrates at the mine site implies significant additional road traffic throughout the shipping season to get the additional ore containers to the port. It is also not clear if the ore concentrate stockpiles will be covered to prevent fugitive dust. More road traffic implies more fugitive road dust generation.	An enhanced fugitive road dust control plan is needed for this variant and is not provided. If ore concentrate is stockpiled for 6 months, please explain how fugitive dust will be controlled on these stockpiles.	Request information from applicant and adjust analysis in the EIS		Fugitive dust control plan provided is conceptual in nature and cannot be considered a mitigation measure. Please consider adding to the EIS document the following statement: "*Within the limits of its regulatory authority, DEC can require an assessment of ambient air quality to verify whether fugitive dust is causing or significantly contributing to concentrations of particulate matter above ambient air standards*."

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Fugitive Dust	DEC/ Air Quality Division	Chapter 4: Environmental Consequences	4.4.2.3	4.4-8	Paragraph three, bullet one on this page discusses Air Exposure Pathways. The final sentence in bullet one states "*In addition, with implementation of dust mitigation measures, the potential localized and near-field air quality fugitive dust impacts from the project would be further reduced."* As discussed above, the promise of creating a fugitive plan does not provide mitigation of impacts, so it is not clear how this statement can be true.	If fugitive dust control will be considered a mitigation measure, please provide a written plan, including information regarding which agency would be responsible for compliance and enforcement.	Request information from applicant and adjust analysis in the EIS		Fugitive dust control plan provided is conceptual in nature and cannot be considered a mitigation measure. Please consider adding to the EIS document the following statement: "*Within the limits of its regulatory authority, DEC can require an assessment of ambient air quality to verify whether fugitive dust is causing or significantly contributing to concentrations of particulate matter above ambient air standards.*"
Fugitive Dust	DEC/ Commissioner's Office	Appendix K: Section 4.10 Heath and Safety		K4.10-26	Paragraph one, bullet three on this page discusses mitigation measures that would be used to control dust generation at the mine site and along the transportation corridor. It further notes that "PLP has committed to development of a fugitive dust control plan (FDCP) for mitigation and control of project activity related fugitive dust and wind erosion." It is unclear how a commitment by the project applicant to develop a fugitive dust control plan may be considered mitigation for purposes of the 404 permit or NEPA analysis. According to Forty Most Asked Questions Concerning CEQ's NEPA Regulations #19b, "The probability of the mitigation measures being implemented must also be discussed, to ensure that the environmental effects of the proposed action are fairly assessed." .	Please consider providing a written fugitive dust plan so that the reader and decision makers will understand the details.	Request information from applicant and adjust analysis in the EIS		Fugitive dust control plan provided is conceptual in nature and cannot be considered a mitigation measure. Please consider adding to the EIS document the following statement: "*Within the limits of its regulatory authority, DEC can require an assessment of ambient air quality to verify whether fugitive dust is causing or significantly contributing to concentrations of particulate matter above ambient air standards*."
Mitigation or Monitoring Measures	DEC/ Commissioner's Office	Chapter 5: Mitigation	Table 5-2	5-8	Item three on this page discusses a Fugitive Dust Control Plan (FDCP) as a propose mitigation measure. It is not clear how the promise of future development of a plan can be considered mitigation. This type of "paper mitigation" does not solve the environmental problems disclosed in the NEPA document. According to Forty Most Asked Questions Concerning CEQ's NEPA Regulations #19b, The probability of the mitigation measures being implemented must also be discussed, to ensure that the environmental effects of the proposed action are fairly assessed. As this statement does not provide actual mitigation and also does not make clear what agency would be responsible for compliance and enforcement, it cannot be considered mitigation.	If fugitive dust control will be considered a mitigation measure, please provide a written plan, including information regarding which agency would be responsible for compliance and enforcement.	Request information from applicant and adjust analysis in the EIS		Fugitive dust control plan provided is conceptual in nature and cannot be considered a mitigation measure. Please consider adding to the EIS document the following statement: "*Within the limits of its regulatory authority, DEC can require an assessment of ambient air quality to verify whether fugitive dust is causing or significantly contributing to concentrations of particulate matter above ambient air standards*."

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Mitigation or Monitoring Measures	DEC/ Division of Water, Water Quality Standards	Chapter 5: Mitigation	Table 5-2	General	This table discusses proposed mitigation measures that the applicant has incorporated into the project. It is not clear which agency will be responsible for compliance and enforcement of these mitigation measures. According to Forty Most Asked Questions Concerning CEQ's NEPA Regulations #19b, The probability of the mitigation measures being implemented must also be discussed, to ensure that the environmental effects of the proposed action are fairly assessed.	Please discuss which agency will be responsible for compliance and enforcement of these mitigation measures so the reader can determine the probability of the mitigation measures being implemented.	Comment noted. No change to document needed in response to this comment.		It should be noted that DEC is only responsible for ensuring compliance with DEC standards and permit. Please discuss which agency will be responsible for compliance and enforcement of mitigation measures outside of DEC's authority.
Pipeline	DEC/ Division of Water, Wastewater Discharge Authorization Program	Chapter 3: Affected Environment	General		The department's Statewide Oil and Gas Pipeline General Permit does not cover discharges to marine water for horizontal directional drilling (HDD). The department is currently in the process of reissuing General Permit AKG315200 - Oil and Gas Exploration, Development and Production in State Waters in Cook Inlet that includes discharges from HDD boreholes into marine waters of Cook Inlet.	The DEIS should be updated as a appropriate to include this information, as it is critical to the 404 permit.	Modify EIS as recommended by commenter.		No mention of AKG315200.
Pipeline	DEC/ Air Quality Division, Air Permitting Program	Appendix K4.20	K4.20.2.3	K4.20-12	Similar to the approach to the other component phases, considering the construction of the pipeline corridor impacts in isolation of other emission sources of air pollution that operate concurrently is not an appropriate approach, and will underestimate the cumulative ambient air impacts.	Conduct a new ambient air quality analysis that includes all sources in the project area that emit pollutants concurrently; or, if already performed, revise this paragraph to better describe the approach.	Verify accuracy of statement by commenter and revise EIS as appropriate.	No additional ambient air analysis is necessary.	Cumulative impacts of multiple activities need to be combined and analyzed
Reclamation and Restoration	DEC/Environmental Health Division, Solid Waste Program	Appendix N	6.1	72	Details on the closure of the on-site monofill need to be included in the discussion on this page.	Discuss closure of the on-site monofill when discussing closure and reclamation.	Modify EIS as recommended by commenter.		Monofill closure not adressed in Appendix N
Spills - concentrate or slurry	DEC/ Spill Prevention and Response Division	Chapter 4: Environmental Consequences	4.27.4.7	4.27-43	Paragraph six on this page discusses concentrate spilled onto soils. The paragraph states that "*Historical data from Red Dog Mine show that most concentrate spills that impact land only and do not enter surface water have a nearly 100 percent recovery (ADEC 2018h).* It is not clear how this conclusion was reached by querying the department's spills database. Prior studies have identified that spills prior to 1995 are not included in the DEC database and a number of lead and zinc concentrate spills occurred prior to 1995. See https://dec.alaska.gov/media/15455/rev-workplan.pdf	Please explain how the conclusion was reached that concentrate spills have nearly 100 percent recovery at the Red Dog Mine.	Verify accuracy of data cited by commenter and revise EIS as appropriate.		No change. Text still reads "*Historical data from Red Dog Mine show that most concentrate spills that impact land only and do not enter surface water have a nearly 100 percent recovery*." If this was true, why is SPAR overseeing cleanup efforts.
Spills - concentrate or slurry	DEC/ Air Quality Division	Chapter 4: Environmental Consequences	4.27.4.7	4.27-45	Paragraphs one and two on this page discuss the impacts of concentrate spills and fugitive dust on air quality. Paragraph two notes "*Concentrations of particulate matter could temporarily exceed the NAAQS concentrations; but over time, the air quality would return to pre-activity levels at the completion of the activity. The extent of impacts would be limited to discrete portions of the project area, where the spill took place.*" This statement appears to conflict with the department's experience with concentrate spills and fugitive dust at the Red Dog Mine and Delong Mountain Transportation System road, given that concentrate transport will not be "temporary" in any sense.	Please explain how the conclusion was reached that the impacts would be temporary and limited to discrete areas in the project area.	Modify EIS as recommended by commenter.		Text changed slightly to say that air quality would return to pre-spill conditions. The main comment was asking for support for this conclusion. No additional support provided.

Topic (use drop-down box)	Agency/Department	EIS Chapter	Section/Fig./Table	Page #	Comment/Issue	Recommendation/Action	USACE DIRECTION TO CONTRACTOR (use drop-down box)	USACE COMMENTS	DEC RESPONSE TO CORP
Spills - concentrate or slurry	DEC/ Commissioner's Office	Chapter 4: Environmental Consequences	4.27.4.7	4.27-54	Paragraphs one on this page discusses the impacts of concentrate spills and fugitive dust on air quality. Paragraph two notes "*Concentrations of particulate matter could temporarily exceed the NAAQS concentrations; but over time, the air quality would return to pre-activity levels at the completion of the activity. The extent of impacts would be limited to discrete portions of the project area, where the spill took place.*" This statement appears to conflict with the department's experience with concentrate spills and fugitive dust at the Red Dog Mine and Delong Mountain Transportation System road, given that concentrate transport will not be "temporary" in any sense.	Please explain how the conclusion was reached that the impacts would be temporary and limited to discrete areas in the project area.	Modify document to analyze potential impacts.		Text changed slightly to say that air quality would return to pre-spill conditions. Main comment was asking for support for their conclusion. No additional support provided.
Unclassified	DEC/ Air Quality Division, Air Permitting Program	Chapter 4: Environmental Consequences	4.20.3.1	4.20-4	The paragraph discussing construction on this page uses 500 hours as the maximum allowable hours per year for emergency fire pumps. 500 hours is an EPA figure used to calculate Potential to Emit (PTE) and is not an operating hour limitation. Emergency units can operate to the maximum extent needed	Please revise the discussion to simply focus on 500 hours as a PTE estimate, nothing more. The ability to estimate actual emergency use data may be gathered from similar sources and facilities.	Modify EIS as recommended by commenter.		Detailed data on emergency fire pumps removed from this section. Appendix K4.20 still says "For the fire water pump engines, it was estimated that an expected upper limit would be 500 hours per year."
Unclassified	DEC/ Air Quality Division, Air Permitting Program	Chapter 4: Environmental Consequences	4.20.3.1	4.20-6	The paragraph at the top of this page discusses emissions inventory to include "back-up generator". EPA no longer uses this term, a unit is either prime power/normal source or an emergency source. Emergency sources have different PTE calculations based on assumed limitations.	Please remove all references to "backup generator"; a unit is either normal-source prime power or an emergency unit. Each type of the two have differing air quality applicable requirements.	Modify EIS as recommended by commenter.		Reference to backup" generator" still appears in text.
Unclassified	DEC/ Commissioner's Office	Chapter 4: Environmental Consequences	4.20.6	4.20-21	Paragraph one on this page discusses the impact of climate change on the project. Sentence one notes that *"It is projected that the project area will see an overall increase in temperatures, with an increase in precipitation during the winter months, and a slight decrease of precipitation during the summer months."* It is not clear what is meant by an increase in precipitation during the winter months. Precipitation covers both snow and rain. Does this mean an increase in the water equivalent of overall precipitation or is it meant to imply that there will be an increase in rainfall during the winter months?	Please explain what is meant by an increase in precipitation during the winter months.	Modify EIS as recommended by commenter.		No further explanation on winter precipitation provided. Please explain what is meant by an increase in precipitation during winter months.
Unclassified	DEC/ Commissioner's Office	Chapter 4: Environmental Consequences	4.27.7.9	4.27-120	Paragraph six on this page discusses groundwater quality and the potential for contamination with elevated levels of metals from a release of untreated contact water. The section further notes that *"Metals present in the released contact water could potentially permeate through soils and sediments into shallow groundwater during the months-long release. However, due to the strong dilution of surface water and groundwater that would occur, it is likely that metals would be diluted to below ADEC groundwater cleanup levels. Measurable impacts to groundwater quality are not likely from this scenario."* This does not discuss what would happen if the metals are not diluted to below ADEC groundwater cleanup levels. The Environmental Consequences section of an EIS is important because it is predicting effects. These predictions are based on (1) assumptions used in the effects analysis (2) the data used and the quality of the data, (3) the methods and models used and (4) a discussion of the cause-effect logic. These statements do not appear to take that approach. General statements about environmental effects and cumulative effects are not considered adequate. see *Neighbors of Cuddy Mountain v. U.S. Forest Service, 137 F.3d 1372, 1379 (9th Cir. 1998)*	Please provide a discussion of the assumptions, data, methods and models and the cause-effect logic used to reach these conclusion that metals would be diluted to below ADEC groundwater cleanup levels. Please provide a discussion of the impacts when contaminated groundwater levels exceed ADEC groundwater cleanup levels.	Comment noted. No change to document needed in response to this comment.		No support for conclusion that metals would be diluted to below ADEC groundwater cleanup levels. Please provide support.

Topic (use drop-down box)	Agency/Department	EIS Chapter	Section/Fig./Table	Page #	Comment/Issue	Recommendation/Action	USACE DIRECTION TO CONTRACTOR (use drop-down box)	USACE COMMENTS	DEC RESPONSE TO CORP
Unclassified	DEC/ Air Quality Division, Air Permitting Program	Appendix K4.20	K4.20.1.1	K4.20-2	Text on this page states that *"Evaluation of PSD Class I increments are not included, because it is anticipated that the closest Federal Class I areas are too far from the project to be impacted by the project."* It should be noted that in other areas the EPA has interpreted the "may affect" clause to include all sources within 100km, and**some large facilities beyond 100km**, from a Class I areas. The proposed project is approximately 130km from Tuxedni National Wildlife Refuge (distance between the two closest boundaries), a Class I area, and will potentially be a large source of emissions. Therefore, the project may impact air quality in a Class I area.	Please perform a Class I increment analysis, or address the issue of potential impacts more explicitly (if appropriate).	Comment noted. No change to document needed in response to this comment.		Please perform a Class I increment analysis, or address the issue of potential impacts more explicitly (if appropriate).
Water and Sediment Quality	DEC/Environmental Health Division, Solid Waste Program	Appendix N	6	71-73	The department's Solid Waste Program has concerns regarding final disposal of the potentially acid generating (PAG) and metal leaching (ML) waste in the open pit lake. While the understanding of the mitigation of PAG is clear, the impacts of additional metals (Al, As, Cd, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Se and Zn, and others) have not been clearly addressed.	Please address metal leaching waste in the pit lake and explain the potential impacts.	Comment noted. No change to document needed in response to this comment.		Please address metal leaching waste in the pit lake and explain the potential impacts.
Water and Sediment Quality	DEC/ Division of Water, Water Quality Standards	Chapter 4: Environmental Consequences	4.18.3.1	4.18-18	Paragraph two on the this page summarizes the effects on mine site groundwater quality. It notes *"In terms of duration, groundwater quality beneath the NFK west and NFK east drainages in the immediate vicinity of the mine site would be impacted during operations, but would be expected to improve in the decades after mine closure."* This assertion that the groundwater quality would improve in the NFK drainages over time appears to conflict with the previous text in this section which suggests degradation or uncertainty. In addition, potential remedies to groundwater impacts and whether they would be practical are not discussed.	Please provide information in support of the conclusion that groundwater quality will improve over time and discuss potential remedies if groundwater quality does not improve.	Modify document to analyze potential impacts.		No support provided for the conclusion that groundwater quality would improve over time or any analysis of potential impacts. Text changed to read: "If monitoring shows that water quality is not improving during the post-closure period, additional remedies would be implemented to treat the impacted groundwater, as needed."
Water and Sediment Quality	DEC/ Division of Water, Water Quality Standards	Appendix N		73	The first paragraph on this page discusses post-closure management of the pit lake. It notes *"The pit lake is expected to stratify during the closure period with surface waters retaining a neutral to slightly basic pH over time."* It is not clear how this conclusion was reached	Please explain what modeling has been done to make this conclusion. Also, please address the scenario and mitigation measures needed if the pit lake does not stratify and in fact turns over.	Modify document to disclose potential impact.		No modification made. Please provide support for this conclusion.
Water Management or Treatment	DEC/ Division of Water, Water Quality Standards	Chapter 3: Affected Environment	3.17	3.17-8	Placement of the TSF seepage collection point on top of a gravel/gravelly sand matrix rather than atop a clay/mud layer is problematic as there is noted potential for seepage and groundwater intrusion due to liner failure (see 4.16). It seems that seepage will be harder to determine and monitor for under this scenario, rather than having a semi-permeable layer below the TSF and then monitoring for lateral flow.	Please include additional information regarding how the collection pond location was determined, how natural geology/ geomorphology was incorporated into the design, and additional information on the number and location of monitoring wells or other monitoring that will be used to ensure that all seepage would be captured.	Modify document as stated in USACE COMMENTS	Modify document to disclose potential impact, based on available information.	No additional discussions found.
Water Management or Treatment	DEC/ Division of Water, Water Quality Standards	Chapter 4: Environmental Consequences	4.18.3.1	4.18-4	Discussions on this page regarding discharges for water treatment plants are unclear. It is unclear where the outfall discharge locations will be for all WTP Discharges (North, East, and South). Of particular concern is the discharge for WTP Discharge South, as it appears to be discharging either into Frying Plan Lake or very near to it	Please provide additional clarification as to the discharge locations and the potential receiving waters that might be impacted.	Modify EIS as recommended by commenter.		Location of WTP discharge location near Fryiing Pan Lake not found. Location may be found in PLP RFIs

Topic (use drop-down box)	Agency/Department	EIS Chapter	Section/Fig./Table	Page #	Comment/Issue	Recommendation/Action	USACE DIRECTION TO CONTRACTOR (use drop-down box)	USACE COMMENTS	DEC RESPONSE TO CORP
Water Management or Treatment	DEC/ Division of Water, Water Quality Standards	Chapter 4: Environmental Consequences	4.18.3.1	4.18-4 and 4.18-5	The last paragraph on this page notes that *"there is some concern that salt and selenium could build up over time in the pyritic TSF, which has the potential to lead to increased total dissolved solids (TDS) concentrations that would require treatment in the main WTP. This may require further investigation as design progresses, and/or a long-term adaptive management strategy."* It is not clear what the salts are comprised of and their anticipated solubilities. It is also not clear how the salts and selenium are going to be prevented from re-mobilizing and entering the system within the pyritic TSF if water quality conditions change.	Please explain what the salts are comprised of and their anticipated solubilities. Please describe how salt and selenium are going to be prevented from re-mobilizing and entering the system within the pyritic TSF if water quality conditions change. Please also outline what would happen at closure when the tailings are re-located and submerged in the main pit. Please consider additional studies (modeling and laboratory testing) to determine the composition of the salts, their corresponding solubilities, and the potential for remobilization within the pyritic TSF, transfer to the open pit at closure, and at final closure when the deposited sub-aqueously into the open pit.	Modify document as stated in USACE COMMENTS	Modify document to disclose potential impact, based on available information.	Document was not modified to disclose potential impact. Document now states "The technical viability will require further evaluation during the permitting phase with the State of Alaska." It is not clear if deferring analysis is appropriate.

From:	Vaughan, Molly
To:	POA Special Projects
Cc:	McGrath, Patricia
Subject:	[Non-DoD Source] EPA Comments on Pebble Pre-FEIS
Date:	Thursday, March 26, 2020 5:10:52 PM
Attachments:	CA_PFEIS_Comment_Form_EPA 032620.xlsx

Hello Shane,

Thank you for accommodating the additional time to allow us to complete the consolidation of our comments on the admin FEIS for Pebble Mine. Attached are EPA's comments on that we believe would be beneficial to address in the Final EIS to improve the overall quality and defensibility of the Final EIS. To assist the Corps in prioritizing work, we have highlighted those comments that EPA considers would provide the greatest improvement in each of the resource areas.

Please note that comments on fish, wetlands and mitigation sections are largely related to analysis that supports the CWA 404(b)(1) evaluation. We recommend that integrating this information into the Final EIS will help provide for a more complete and transparent document and support the general principles of EO 13807 for coordinated, consistent, predictable and timely environmental reviews that are recommended for any EIS.

These interagency comments or portions thereof may be protected by the deliberative process privilege.

Regards,
Molly

Molly Vaughan
Policy and Environmental Review Branch
U.S. EPA Region 10, Alaska Operations Office
907-271-1215
vaughan.molly@epa.gov

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.6 Commercial and Recreational Fisheries	3.6.1.2	3.6-6	It is not clear what is meant by "intense run timing," and why that influences revenue.	We recommend that this be clarified in the FEIS.	
3.6 Commercial and Recreational Fisheries	3.6.1.2	3.6-6	It is unclear what is meant by "Copper River is typically Alaska's first major sockeye salmon fishery, thus yielding a higher market price."	We recommend that the FEIS explain how the Copper River is relevant in light of the proposed project, or delete this statement.	
3.6 Commercial and Recreational Fisheries	3.6.1.2	3.6-7	It is not clear what the importance of Bristol Bay branding of salmon has on the region.	We recommend that the Corps clarify and/or update text in the FEIS, as appropriate, to more fully assess the potential impact to fisheries and the quality of fisheries under the branding label.	
4.6 Commercial and Recreational Fisheries	4.6	4.6-2	It is not clear what is meant by "....decline in the productivity of Bristol Bay river systems from placement of fill in water functioning as fish habitat...."	We recommend that the statement be clarified in the FEIS.	
Chapters 3.34 and 4.24, Fish Values Overarching Comment			EPA's overarching comment is that fish and macroinvertebrates are the receptors of alterations to water quantity, quality, and chemistry and habitats from the proposed project.	As detailed in our comments below, we recommend revisions to the FEIS to more fully and accurately analyze and disclose the potential changes to or losses of these resources, and to quantify the impacts and consequences to fish.	
3.24, 4.24,3.6, 4.6, Commercial and Recreational Fisheries	4.6	General Comment	There are no substantial impacts to recreational or commercial fisheries indicated. This is a consequence of there being no estimated impacts on fish populations/distributions from the development and operation of the proposed mine under all of the alternatives. The PFEIS does give a historical overview of the past and current economic value generated from these fisheries, but determines that most of that value is not at risk since fish populations will be unaffected with development of the mine. The PFEIS acknowledges that some recreational anglers may choose not to visit the area if the mine is developed, but states that since recreational anglers are mobile they will find new places to fish and the businesses which cater to these anglers will need to "change the services they offer," "access new locations via air," or "lose their clientele."	We recommend that the Corps clarify and/or update text, as appropriate, to more fully analyze the potential changes in fish populations in the affected waterways, the potential subsequent alterations to and displacement of recreational and commercial fishing effort, and the related economic impacts of those alterations.	
3.24 Fish Values	3.24.2 Habitat Characterization	3.24-1	We continue to be concerned regarding the lack of an identified framework for habitat characterization and studies.	We recommend that the FEIS include information on habitat characterization, including how habitats were identified, which habitats were characterized, and at what scale.	
3.24 Fish Values		3.24-4	It is not clear what species and densities of resident fish occur at the proposed mine site, their relative distribution and densities in the headwaters and downstream areas, and their contributing importance to fish assemblages in the project waters.	We recommend that the Corps clarify and/or update text, as appropriate, to more fully discuss species densities and potential impacts in/near the project area.	
3.24 Fish Values	3.24.3	3.24-4, Inset box: Impacted mine site streams - habitat and fish use	The importance of headwater streams is a major point of concern in our DEIS comment letter and we believe that further analysis is warranted regarding this issue Specifically, the PFEIS does not acknowledge the critical importance or role of headwater streams, such as their contribution to downstream flows, substrate sediment, water temperature regulation, nutrients, and food subsidies, and importance in providing resident and juvenile habitat. Further, there is no supporting evidence in the PFEIS or the scientific literature to suggest that headwater streams are of low value. Therefore, the five bullets of text inside the box "Impacted mine site streams- habitat and fish use" may not accurately present the value of the headwater system.	We recommend revising the text to consider the critical role of headwater habitats for rearing fish and for supplying downstream nutrients and subsidies. **Return to Excerpt** **Return to Excerpt**	
3.24 Fish Values	3.24.3.1, NFK	3.24-8, paragraph 2	Regarding: "Overall, 17 2nd to 3rd order headwater tributaries enter the mainstem NFK (US Geological Survey Hydro Streams GIS layers), along with over a dozen small channels."	We recommend that the FEIS explain what is meant by "along with over a dozen small channels." For example, we recommend that the FEIS clarify what the channels are, whether they are fish habitat, the flow inputs, and whether "channels" are being defined differently from "streams."	
3.24 Fish Values	3.24.3.1 Spawning and rearing habitat	3.24-16	Regarding: "These areas are more prevalent in the middle and lower reaches of the NFK, SFK, and UTC, as evidenced by the extent of open water during winter surveys."	Because it is important for the reader of the FEIS to understand the limitations of the data collection efforts being used to draw conclusions related to project impacts, we recommend that the FEIS provide a reference for the winter surveys.	
3.24 Fish Values	Table 3.24-4	3.24-17	We continue to be concerned that only a subset of fish species are being considered in the impact analysis. We note that resident species are critical representatives of fish communities and assemblages.	We recommend that the FEIS include similar data for resident species, as available in the AFFI and other source databases.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.24 Fish Values	Table 3.24-4	3.24-17	The table presents miles of spawning and rearing salmonid and trout habitat.	We recommend including information for resident and other species present in the area. We also recommend including lake habitats, such as the 150 -acre Frying Pan Lake which is salmonid juvenile rearing habitat, and supports Northern Pike.	
3.24 Fish Values	3.24.3.1, Groundwater influence	3.24-18	Regarding: "Emerging groundwater produces a cooling effect on mainstem flows during summer, a warming effect during winter, and has direct relationship with spawning site selection for several salmonid species."	While the PFEIS acknowledges a relationship between salmonid species site selection and groundwater, it does not account for it in habitat modeling (PHABSIM), HSC development, quantification of habitat, or the consequences of fish from the loss of groundwater areas. Based on their winter open water surveys, NFK has copious amounts of open water in the winter (Figure 3.24-2). We recommend that groundwater influence be more fully considered in the FEIS analysis.	
3.24 Fish Values	UTC, Mainstem and tributary habitat	3.24-22 and Figure 3.24-4	Regarding: "Approximately 23 tributaries of 2nd order or greater drain into UTC, along with dozens of smaller channels."	We recommend assuring that all waterways are represented in the FEIS, including the "dozens of smaller channels" referenced here. In addition, we recommend providing additional information to characterize these channels, including the ecosystem services they provide.	
3.24 Fish Values		3.24-23 and Figure 3.24-3	Regarding: "As seen in the NFK and SFK, off channel habitats in UT intensive study sites are dominated by beaver complexes (93 percent), with other off-channel habitat types, compromising 1 to 3 percent."	We recommend that the FEIS disclose the importance and role of off channel habitats such as beaver ponds for fish habitat, and the association with hydrologic connections found.	
3.24 Fish Values	UTC, Salmon spawning and rearing habitat	3.24- 23	Regarding: "The distribution of juvenile [Coho] salmon was similar to that for spawning, with the addition of several minor tributaries."	We recommend that the FEIS clarify where the "several minor tributaries" are located and whether they are included in the quantification of habitat or represented in the figures.	
3.24 Fish Values	UTC, Surface water temperatures	3.24- 24	Regarding: "The exceedance percentage for the 15 degree C migration and rearing threshold for UTC was 44 percent; whereas comparable exceedance values for the 13 degrees spawning and egg incubation criteria were 59 percent of readings." It is not clear to the reader what this information is referring to or what it means; and there are no references.	We recommend that the FEIS explain what the exceedances are in reference to, and what they mean and that the FEIS include references and data analysis to support the presumed baseline information.	
3.24 Fish Values		Table 3.24-5, Page 27	The incubation life stage is provided as a footnote.	We recommend adding the incubation stage into the table to represent the periodicity.	
3.24 Fish Values	3.24.4	3.24-72	Regarding: “Locations for macroinvertebrate and periphyton sampling were selected to characterize diversity, abundance, and density in freshwater habitats in the transportation and natural gas pipeline corridor study area (see Figure 3.24-15).” Figure 3.24-15 does not show any macroinvertebrate or periphyton sampling sites along the transportation corridor.	We recommend either editing the figure reference or revising the figure, as appropriate.	
3.24 Fish Values	3.24.4	3.24-72	This section is one of the few sections that doesn't consider different alternatives separately. As a result, it suggests that available data (which are limited to begin with) are more broadly applicable across the different alternatives. For example, p 3.24-72 states: "Sampling to characterize the invertebrates in streams potentially affected by the port access roads was conducted at two sites: Y Valley Creek, and an unnamed creek site (see Figure 3.24-17). As a relatively small portion of the transportation corridor would be in Cook Inlet drainages, two locations were established for macroinvertebrate and periphyton sampling." This port access road is not relevant to the applicant's preferred alternative, but this is not mentioned. This is also included in the mine access road section, not the port access road section.	We recommend ensuring in the text that the data discussed are included in the relevant section and clarify which data are applicable to which alternative. Where data are limited, we recommend that this be clearly acknowledged in the text.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.24 Fish Values	3.24.4	3.24-79, 3.24-82	Regarding: "The majority of beach spawning occurs in the eastern end of the lake (Figure 3.24-19)." We note that the statement implies that comprehensive sampling of beach spawning was conducted, while it seems more likely that this sampling was concentrated in the eastern part of the lake, since this was where the transportation corridor was originally planned to go. And: "In general, the ferry terminal locations and crossing routes are not heavily used by spawning sockeye salmon (Figure 3.24-19). Aerial and snorkel surveys were conducted in July and August near potential ferry terminal sites (Paradox Natural Resources 2018c, d)." We note that this statement is based on very limited data temporally.	We recommend that the FEIS clarify limitations of the available data when making definitive statements, or provide additional evidence that supports these statements.	
3.24 Fish Values	3.24.4.4., Iliamna Lake	3.24-83, Aquatic Invertebrates	Regarding: "Freshwater mussels were collected as part of the Iliamna Lake study (HDR 2011a, Appendix B)"	We recommend disclosing the ecological importance and inter-specific relationships of species. For example, please discuss the various fish host species (i.e., sockeye, stickleback) that transport glochidia in their gills serve as a means of distributing mussel glochidia throughout streams and lakes.	
4.24 Fish Values	General		We previously recommended analyses of groundwater impacts to fish, the receptors of the impacts and continue to be concerned that the PFEIS does not adequately analyze the role and importance of groundwater to fish and fish habitat (i.e, for spawning, incubation, thermal regulation, overwintering, macroinvertebrates, cleansing and oxygenation of eggs), and consequences to fish from alterations in groundwater pathways.	We recommend that the Corps clarify and/or update text in the FEIS, as appropriate, to more fully analyze potential impacts to groundwater and the consequences to fish.	
4.24 Fish Values	General		The PFEIS does not disclose information that would inform the reader of how robust Project fish sampling efforts were (i.e., what days, weeks, months, seasons that sampling occurred, sampling design, gear types) that would substantiate fish distribution and abundance claims throughout the document. Further, the Project's EBD 2011 of baseline fish studies should be referenced. Some of this sampling information may be included in supporting documents, but it is critical that sufficient information is presented with tables, figures, and analyses in the main FEIS document itself, to allow informed consideration of the values and conclusions presented.	We recommend that the FEIS include specific information on sampling design and effort for fish species distribution and abundance. This information would include not only the range of years over which data were collected and the total number of samples collected (which are presented in some parts of the document), but more specific information such as sampling frequency (the number of times each site was sampled); the spatial and temporal distribution of sampling events (e.g., "site A was sampled once in 2004 and once in 2007" is not the same thing as "site A was sampled 2004-2007"); the total number of sampling events each data value is based upon; how mean values were calculated; and other specifics that allow the reader to understand data robustness and what that may mean regarding conclusions made in the FEIS. This can be done concisely within the FEIS itself using summary tables, or by adding notes to existing tables and figures.	
4.24 Fish Values	General		The PFEIS does not provide sufficient context for what is meant by "anadromous waters," and thus implies that any water not currently designated as anadromous is not used by anadromous fish. For example, p3.24-69 states: “These access roads would cross waterbodies documented to support fish, many of which are classified as anadromous fish habitat.” This suggests that many have been found to be not anadromous, when this more likely reflects lack of sampling.	We recommend that the FEIS clarify that anadromous waters are ones in which anadromous fish have been found (see below). If a water is not listed as anadromous in the Anadromous Waters Catalog, it does not necessarily mean that anadromous fish are not found there (e.g., it often means it hasn't been sampled, or sampled sufficiently to capture adequate temporal variability in species occurrence). Example text from the AWC website: "However, based upon thorough surveys of a few drainages it is believed that this number [anadromous waters] represents a fraction of the streams, rivers, and lakes actually used by anadromous species." To be considered an anadromous water, "Anadromous fish must have been seen or collected and identified by a qualified observer. Most nominations come from Department of Fish and Game fisheries biologists. Others are received from private individuals, companies and biologists from other	
4.24 Fish Values	General Comment			We recommend that the potential for flow alterations be representative of those in the tributaries and mainstems to present an accurate representation across the landscape of alterations and percent alterations, and that the FEIS provide the representative information needed to accurately quantify potential losses and impacts.	
4.24 Fish Values	General comment		Stream miles above points of dilution are not provided.	We recommend that the FEIS provide the number of miles of stream above dilution points that will be impacted by contaminants from the project (e.g., Copper, selenium, mercury, cadmium, lead, zinc, etc).	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.24 Fish Values	General comment		We are concerned that the PFEIS continues to minimize the importance of habitats and repeatedly uses wording such as "low use" and "low quality" of habitats across the landscape of a part of Alaska known to be the world's most productive sockeye salmon fishery. Return to Excerpt	We recommend removing the assertions of "low use" and "low quality", because the data collection efforts referenced represent a snapshot in time -other data published do not necessarily lead to the stated conclusions in the PFEIS. See Brennan et al. 2019 for more details supporting this recommendation.	
4.24 Fish Values	General comment		The project proposes many temporary and permanent alterations, eliminations and fragmentations of aquatic and terrestrial habitats across the landscape. As a consequence of the homogenized, compromised and fragmentation of habitats, aquatic/terrestrial predator and prey energy flows will likely be reduced.	We recommend that the EIS disclose potential consequences to brown bears and other terrestrial species from permanent temporal and spatial interruption of energy transfer (e.g., wildlife interactions) from aquatic resources such as water, salmon, and other food subsidies (Armstrong et al., 2019).	
4.24 Fish Values	General Comment		The PFEIS appears to undervalue the importance of Iliamna Lake to fish.	We recommend that Iliamna Lake be acknowledged in the FEIS as rearing/nursery habitat for the Bristol Bay sockeye salmon fishery.	
4.24 Fish Values	General Comment, Scale of Impacts		The PFEIS does not identify the scale of impact or describe how this analysis was conducted or conclusions were drawn.	We recommend that the FEIS identify the appropriate scale of impact, based on what is measured and the mechanism of impact. The appropriate scale to conduct an impact analysis is that which effectively captures: 1) important locally-adapted populations, which in the Bristol Bay region can occur at very fine special scales (e.g., the small pond populations of sockeye salmon studied by Quinn et al.); and 2) scales of disturbance regimes, local variation in climate, or other variations that can drive locally-independent populations responses of salmon that are part of a larger portfolio.	
4.24 Fish Values	General comment, Fish Habitat		The PFEIS does not appear to provide sufficient information to allow the reader to understand how fish habitat across river drainages will be impacted by the project. This is due in part to the application of limited-use flow modeling tools applied to quantify fish habitat, and the lack of a structured habitat framework used and presented in the PFEIS to assess habitat and potential impacts.	We recommend revising the analysis to ensure that tools used predict a reasonable scope and scale of potential impacts to fish habitat and that account for representative habitats.	
4.24 Fish Values	General comment, Fish life history stages		It is not clear why the PFEIS does not discuss the continuum of life history stages of fish (i.e., natal homing, migration, spawning/incubation, overwintering, rearing, overwintering) and the spectrum of environmental requirements needed to successfully reproduce to sustain viable populations. At best, life history stages are presented as discrete and unrelated events. In this way, potential impacts and consequences to fish communities and populations are not carried forward for analysis. This approach does not reasonably represent the wild fish species and populations supported by what is currently an intact landscape.	We recommend the PFEIS include analyses that presents cumulative impacts to fish species and life stages on a time continuum, so the reader can understand the consequences to each life stage of each fish species, based on their life history strategies.	
4.24 Fish Values	General Comment, Water quality as it pertains to fish and fish habitat		The PFEIS does not discuss the potential impacts to fish and fish habitat from potential violations of water quality standards due to point source discharges or other reasonably forseeable alterations in pH, temperature, DO, and water chemistry more broadly. We believe that this is reasonably forseeable due to uncertainties related to the technical viability of the water treatment process. Return to Excerpt	We recommend that associated impacts and consequences to fish should be disclosed in the FEIS, including scenarios where water quality standards cannot be met.	
4.24 Fish Values		4.24-1	Regarding: "Mine site development would permanently remove approximately 22 miles of fish habitat in the N. Fork Koktuli and S. Fork Koktuli drainages. This loss of habitat is not expected to have a measurable impact on fish populations down stream of the mine site because these narrow, steep, higher gradient streams have lower habitat values and low fish densities compared to downstream reaches." This text is assumed to be in reference to the headwater streams that will be eliminated. As previously noted, headwater streams are of significant value and importance to downstream waters; they play an important role for rearing fish and in providing downstream nutrients and food subsidies.	We continue to recommend revising or providing additional supporting evidence in the FEIS for the statement regarding the headwater habitats being of low value.	
4.24 Fish Values	Mine Site Construction and Operations	4.24- 3, Table 4.24-1 Summary of Key Issues	Regarding "Streamflow: In general, changes in the amount of suitable habitat due to mine operations or during mine closure are predicted to be low; e.g., less than a 2 percent change, in mainstem reaches of the NFK, SFK, and UTC for all species and life stages."	We recommend revising this general summary statement in the FEIS to better capture the full range of factors that contribute to impacts to suitable habitat, which includes changes during the construction phase and changes to tributaries. In addition, we recommend acknowledging that this conclusion is based on instream flow modeling using PHABSIM. The EPA notes that we have concerns with limitations of the PHABSIM model for fish habitat. As such, we have made recommendations in our comments regarding revising the habitat analysis	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.24 Fish Values		4.24-4, Table 4.24-1 Summary of Key Issues	Regarding: "Water chemistry: Permitted discharges from the mine could affect fish and aquatic habitat, however non-point discharges of process water to surface water would not be planned. No chemistry greater than background levels would be expected."	We recommend revising this summary statement to more fully capture potential impacts. We recommend considering a scenario where discharges do not meet permit limits. We think this is a relevant scenario due to concerns raised in AECOM's independent review about the technical viability of the water treatment processes.	
4.24 Fish Values	4.24.3.1	Table 4.24-2	On page 4.24-12, the PFEIS states that treated discharges will be "optimized to benefit priority species and life stages for each month and stream" as shown in Table 4.24-2. It is not clear how this optimization will be achieved, or how differences across species and life stages will result in adverse effects for species other than the target species each month.	We recommend that the habitat analysis explicitly consider habitat requirements of different species and different life stages at ecologically relevant temporal and spatial scales, as well as trade-offs between species and life stages in terms of how discharges are managed.	
4.24 Fish Values		Figure 4.24-1 Mine site area fish distribution, injury and mortality.	We commented previously that fish distribution should be indicated as either "anadromous" or "resident" consistent with the State of Alaska Anadromous Waters Catalog.	We recommend revising the map to reflect "anadromous" and "resident" fish species, and providing references for where the fish distribution information comes from.	
4.24 Fish Values		Figure 4.24-2	Figure 4.24-2 appears to indicate that mining operations will increase suitable habitat.	We recommend that this figure be clarified and/or revised as appropriate in the FEIS in order to accurately reflect project impacts and help determine necessary mitigation measures to reduce those impacts.	
4.24 Fish Values	Figure 4.24-2, Figure 4.24-3, Figure 4.24.4 and Figure 4.24-5.		The Figures do not accurately represent the loss of habitats, as they include only mainstem (and omit tributary) losses.	We recommend correcting the Figures to accurately represent habitat losses from project impacts to both mainstem and tributaries.	
4.24 Fish Values	Direct loss of Aquatic Habitat, NFK	4.24-10, paragraph 2	The information presented in the PFEIS does not acknowledge the critical role of headwater streams to downstream ecosystems that is well established in the scientific literature.	We recommend revising the paragraph to include supporting documentation of conclusions and to include the role and contribution of headwater streams to downstream ecosystem services. We further recommend full disclosure of the fish species use of the habitats and the fish distribution sampling effort that took place.	
4.24 Fish Values		4.24-11, paragraph 3	We continue to be concerned regarding conclusions drawn about intermittent stream reaches.	We recommend revising the paragraph to correct statements and claims of habitat being "unreliable," and referring to the scientific literature to support the importance of intermittent streams to fish.	
4.24 Fish Values	4.24.3.1	4.24-10	Regarding: "Low densities of Chinook and coho salmon were documented in NFK 1.200, indicating that this tributary is not likely to provide high-use habitat." We note that low densities during limited sampling events do not necessarily equate to habitat not being "high-use" or of low value.	We recommend removing this statement and any similar statements based on this assumption from the FEIS, unless scientific support for the statement can be provided.	
4.24 Fish Values	Figure 4.24-1	4.24-11	Figure 4.24-1 "Mine Site Area Fish Distribution Fish Displacement, Injury, and Mortality" does not represent the full potential for the distribution of fish in mainstem and tributaries. We note that some tributaries are missing from the figures, and that it would be important to disclose in the FEIS that not all of the tributaries may have been sampled and that the tributaries may support fish at different times of the year not represented by the project sampling efforts to date.	We recommend that the FEIS present the full potential for fish distribution within the mine site area, by including all mainstem and tributary waters in this figure. We also recommend that the FEIS disclose the limitations of the projects sampling efforts for fish.	
4.24 Fish Values	Direct Loss of Aquatic Habitat, UTC	4.24-12, paragraph 2	Regarding: "Species diversity and abundance data indicate there is sufficient available habitat for relocation without significant impacts to existing populations."	We recommend providing information to support this statement, or delete it from the FEIS.	
4.24 Fish Values	Direct Loss of Aquatic Habitat, UTC	4.24-12, paragraph 2	Regarding: "The extent or scope of these impacts would be limited to waters in the vicinity of the mine site footprint, and may not be observed downstream from the affected stream channel."	We recommend that resulting downstream impacts to fish and alteration and loss of fish habitat be disclosed (e.g., loss of spawning and rearing habitat, water quality impacts, loss of resident species habitat).	.

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.24 Fish Values	Direct Loss of Aquatic Habitat	4.24-12, paragraph 3	Regarding: "Only lower-quality/low-use rearing habitat in the SFK could be affected by blasting at the mine site."	We recommend providing information to support this statement, or revising it in the FEIS. The Project's sampling efforts presented in the PFEIS do not appear to support a conclusion that the rearing habitat is lower quality or low use. Further, we note that fish move around to opportunistically take advantage of a mosaic of habitats.	
4.24 Fish Values	Direct Loss of Aquatic Habitat, UTC, changes in surface water flows, Aquatic habitat alteration due to surface water flow change	4.24-12, last paragraph	We recommend that the paragraph fully disclose impacts to fish spawning and overwintering habitats related to predicted changes to groundwater inputs. We note that it refers the reader to Section 4.17, Groundwater Hydrology.	We recommend that the FEIS analyze and discuss potential alterations as they pertain to consequences to fish species and life stages in the UTC basin, including the impacts of the alterations.	
4.24 Fish Values		4.24-12, last paragraph	This paragraph suggests that the distribution of the spawning and over-wintering habitats related to groundwater input in the analysis area would remain largely unaffected.	We recommend that the FEIS provide analysis to support this conclusion related to consequences to fish and fish habitat.	
4.24 Fish Values		4.24-13, Table 4.24-2	The table reports "releases of surplus treated water" and "priority species" on a monthly temporal scale.	We recommend that information be provided on a time scale relevant to fish and their ability to adjust and respond. The monthly time scale is not useful for determining impacts to fish. We recommend an analysis of the biological consequences on a daily time scale.	
4.24 Fish Values	Impacts to spawning and rearing habitat due to surface water flow changes.	4.24-14	Regarding: "Most changes would be expected to increase suitable habitat (Table K4.24-1) due in part to the release of treated water into the mainstem reaches (or tributaries immediately upstream of the mainstems) of the NFK, SFK, and UTC, according to the species and life stage priorities listed in Table 4.24-2."	This figure implies that there is a linear relationship between increases in discharges and increases in habitat; and likewise, that decreases in discharge equal decreases in habitat. This implication is not supported and as a result, we recommend removing or revising the figure.	
4.24 Fish Values		Beginning on Page 4.24-13	The PFEIS reports changes (e.g., increases and decreases) to species habitats related to alterations in predicted modeled instream flows. We note that flow is not the only predictor of what constitutes fish habitat, and flow alone is not a reliable measure of habitat.	We recommend that the FEIS provide appropriate and thorough discussion of covariates that are supported by the science to be indicators of fish habitat and the potential for increases and decreases. We do not recommend relying on flow alone.	
4.24 Fish Values	4.24.3.1	4.24-13	Regarding: "Actual reductions in streamflow would, in some cases, result in a predicted increase in habitat suitability (as measured in acres) for some species and life stages, particularly those that show preferences for slower water velocities; for example, the juvenile life stages of most species." We find that the PFEIS considers potential impacts of the mine separately - i.e., stressors are examined independently, with limited or no consideration that these stressors will be occuring simultaneously, and thus will interact with each other and potentially have interactive effects on fish and aquatic systems. For example, we are concerned that the PFEIS assumes that velocity decreases will lead to increased habitat for juveniles. We note that velocity decreases will affect sedimentation, which may make these lower flow habitats less desirable. These potential interactions are not addressed in the PFEIS.	We recommend that the FEIS discuss how co-occurring stressors could interactively affect fish.	
4.24 Fish Values		4.24-18	The PFEIS mentions the spawning gravels and groundwater expressions but does not disclose potential impacts relevant to fish and fish habitat, other than to say that, "...the extent of the effects of reduced gravel recruitment would likely be local..."	We recommend the FEIS provide additional information on alterations to substrate and sediment transport, and hydrogeomorphic processes that create and maintain fish habitat. We recommend disclosing potential changes to groundwater expressions and substrate relevant to fish and consequences to fish, and including information to support the claim of the extent of the alterations to gravel recruitment	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.24 Fish Values	Impacts to Off-channel habitat	4.24-19, first paragraph, last sentence	We note that the statement that, "Modeled flows post closure indicate that during dry years mainstem connectivity (to off channel habitats) maybe less than 14 cfs in late winter during the month of April, but return to connectivity with the mainstem in May." does not fully disclose the impacts to fish. For example, this disconnected habitat is going to be problematic for incubating/developing eggs, button-ups, and juveniles that will be stranded. The PFEIS also does not capture or analyze the complexity of off-channel habitats in a discussion of instream habitat classification or PHABSIM flow modeling discussion.	We recommend that the FEIS fully disclose the impacts of the project to fish species and life stages.	
4.24 Fish Values		4.24-19, third paragraph, last sentence	".....so the effects of reduced macroinvertebrate productivity to downstream resources would likely be limited to the area directly downstream of the mine site (within 5 miles)".	We recommend that the consequences to fish from reduced macroinvertebrate productivity be analyzed in the FEIS.	
4.24 Fish Values	Changes to surface water temperatures at discharge locations	4.24-21	"Winter water temperature changes from mine operations could impact eggs and alevins in spawning gravels, primarily through increased metabolism, growth, and changes in time of emergence. However, baseline winter temperatures (November to April/May) in NFK, UTC, and likely SFK are close to 0 degrees C, and are less than the optimum incubation ranges found for Pacific salmon species in the analysis area". We note that fish are locally adapted to local conditions. The degree differences reported in Table 4.24-3 are modeled monthly averages, and for the SFK, the data is limited to the month of April. The PFEIS appears to have limited data and capabilities to quantifiably demonstrate that water temperature alterations will not have significant impacts to fish, especially incubating developing eggs.	We recommend that temperature changes be analyzed and disclosed in the FEIS in the context of baseline temperatures and groundwater expressions, and that daily timestep, not monthly averages, inform the analysis and conclusions, because fish are the receptors of impacts to water under a continuous timestep.	
4.24 Fish Values	Summary of Mine Site Impacts-Applicant's Preferred, Direct Effects	4.24-24	"....Due to the substrate, slope, and lack of cover, this is not considered to be optimal spawning or rearing habitat for anadromous and resident fish...."	We recommend removing this statement from the FEIS. The area is documented to be Coho Salmon habitat in the State of Alaska Anadromous Waters Catalogue.	
4.24 Fish Values	Indirect effects	4.24-25, paragraph 4	"The magnitude and extent of impacts.....would vary among the principal tributaries, according to the degree of surface water and groundwater capture, the location of impacts in the basin, the proximity and size of downstream tributaries, and the magnitude of flow augmentation at the water release facilities."	We recommend including a summary of the quantified indirect effects of the magnitude and extent of impacts.	
4.24 Fish Values		4.24-25	"A principal impact of mine development is the complete loss of NFK headwater tributaries 1.190 and 1.200 beneath tailing facilities and WMPs...."	We recommend that the FEIS quantify and disclose the impact of the stream miles that will be eliminated from the loss of Tributary 1.190 and network tributaries.	
4.24 Fish Values	4.24.3.2	4.24-26	We continue to be concerned regarding fish passage, specifically regarding statements in the PFEIS that free passage of anadromous and resident fish may be temporarily halted during construction but would be reinstated during operation. The response to comments on the DEIS indicates this concern would be addressed in the PFEIS, but there does not appear to be a change in text between the DEIS and PFEIS.	We recommend that the FEIS discuss how fish passage will be addressed, and also how fish passage will be preserved after closure of the mine. We note that PLP's Reclamation and Closure Plan in Section 4.18.5, Access and Mine Roads, states that the access road will remain into the foreseeable future following mine closure, and recommend that the FEIS clarify who will be responsible for maintaining the road and the proper functioning of culverts after mine closure. As noted in Kravitz and Blair (2019), if the road is adopted by the state or local government, the frequency of inspections and quality of maintenance may likely decline compared to the frequency for other roads. We note that this could possibly result in a proportion of failed culverts, similar to that described in the literature.	
4.24 Fish Values	Blasting	4.24-28-29	The PFEIS discloses that "blasting would occur along approximately 25 miles of the south access road between Amakdedori port and the sourth ferry terminal, and along 1.8 miles on the mine access road between the mine site and the Eagle Bay ferry terminal."	We recommend that the potential impacts from blasting to fish and aquatic resources, including incubating eggs and resident and migrating fish, be disclosed, noting required buffer zones and timing windows will not mitigate all impacts to aquatic resources, including several species of resident fish.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.24 Fish Values	Changes to Stream and Lake Productivity, Access Roads and Overland Gas Pipeline	4.24-33	Regarding: "In some locations, such as culvert crossings, the road/pipeline footprint would impact riparian and floodplain connectivity in the 100-year floodplain."	We recommend that the FEIS disclose the consequences and cumulative impacts to aquatic resources from interrupting floodplain connectivity.	
4.24 Fish Values	Iliamna Lake-Ferry Terminals and Natural Gas Pipeline	4.24-33	Regarding: "there would be ...permanent impacts to Iliamna Lake benthos, zooplankton, and productivity".	We recommend that the FEIS disclose the permanent impacts and consequences of the impacts.	
4.24 Fish Values	Increased stream and lake sedimentation and turbidity, Mine and Port Access Roads	4.24-34	The PFEIS states that, "Operations are expected to require 35 truck round trips per day, which would result in dust impacts in proximity to roads, including at stream crossings."	We recommend that the FEIS quantify and disclose the potential impacts to fish and aquatics from dust impacts from the 35 truck RT/day.	
4.24 Fish Values	Summary of Transportation and Natural Gas Pipeline Corridors - Applicant's Preferred Alternative, Direct Effects.	4.24-37, paragraph 4; also page 38	"The Cook Inlet portion of the natural gas pipeline would temporarily impact about 6.8 acres of weathervane scallop habitat." Page 38 further states that, "Because the impact area would be small compared to the unaffected weathervane scallop range in Cook Inlet, and the estimated low number of potential injured or killed scallops, impacts would not be noticeable."	We recommend that these statements be revised/further supported in the FEIS. We recommend disclosing the impacts to the productivity and consequences to the long-term survival of the sessile weathervane scallop in the 6.8 acres.	
4.24 Fish Values	Portfolio Effect	4.24-41	The PFEIS minimizes the Project's impacts on the Portfolio Effect and genetic diversity by footnoting and stating that, "...nor is genetic diversity expected to change.... " and "...impacts to the Portfolio Effect are not likely to be discernable." We note that the quoted statements do not appear to be supported by scientific literature or the data analysis included in the PFEIS.	We recommend the text be revised to reflect the current scientific literature related to the Portfolio effect, and particularly recent literature related to fish populations in the project area (i.e., Brennan et. al., 2019; Larson et. al., 2017; Larson et. al., 2019; Green et. al., 2009; Moore et. al., 2010).	
Appendix K4.24-1: Mine site area of fish distribution	K4.24.5	K4.24-10	Regarding: "These tables [K24-1 through 3] show the magnitude of both increases and decreases in suitable habitat under each operational period and water year scenario." We note that it is not clear for which time step the values are calculated. Flow varies over time and is not the sole determinant of habitat in this analysis. It is also not clear whether these percentages represent annual or monthly averages.	We recommend that the FEIS clarify how these percentages were calculated and recognize that fish do not actually experience annual or monthly average flows. We recommend including discussion of the natural flow regime concept - flows vary over hours, days, weeks, seasons, years, and fish adapt to these naturally variable changes over time. We recommend that the analysis look more holistically at how the natural flow regime will be changed by the project, and how these changes will affect fish.	
Appendix K4.24	Table 4.24-1	K4.24-13-20	The Table does not accurately represent the loss of habitats, as it includes only mainstem (and omits tributary) losses.	We recommend correcting the Table to accurately represent habitat losses from project impacts to both mainstem and tributaries.	
Appendix K4.24		K4.24- 9, Selenite	In reference to "insoluble selenite species," we are unaware of any insoluble selenite species. In addition, the references cited do not discuss any insoluble mercury selenite species. Jin et al. (1997) found that low concentrations of selenium increased net formation of methylmercury, and that high concentrations of selenium increased rates of demethylation and decreased rates of methylation. Chen et al. (2001) indicated that the mechanism of the antagonistic effect of Se on Hg toxicity is complex and depends on geochemical conditions. Troung et al. (2003) indicated that D. desulfuricans is able to reduce selenite to selenide, which results in precipitation of mercury selenide (HgSe), which is an insoluble precipitate, and that D. desulfuricans also is able to detoxify selenite by reducing it to elemental selenium. The sulfate reducing bacteria also will form sulfide, which will form insoluble mercury sulfide.	We recommend deleting the references that do not discuss any insoluble species (Jin et al 1997 and Chen et al 2001) and revising the text to read "insoluble mercury selenide" instead. We also recommend that the FEIS disclose that that some sulfate-reducing bacteria are active at the interface between oxic and anoxic zones (D. desulfuricans, is one example). We also recommend that these sections discuss wetland sediments in addition to river and lake sediments. We note that more sulfate reducing bacteria activity is anticipated in wetland sediments than in rivers.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix K4.24		K4.24-9, Iron in sediments	With respect to the discussion of iron in the sediment samples being high and that "At these levels, iron can interact with sulfur species and may decrease methylmercury production...." we note that these are sediment concentrations, not aqueous element concentrations. In the EBD Chapter referenced, there is no discussion of how the samples were processed to obtain the metals concentrations via ICP analysis. It can be assumed they were done by a total digestion which doesn't represent what amount of iron would be soluble in the pore water. This same point is true for sulfate in the sediment samples. For there to be "...shifting microbial assemblage from SRCs to iron-reducing microbes with less mercury methylation capacity....and by altering mercury bioavailability via interaction with sulfur species....," the iron and the sulfate need to be in the aqueous phase.	We recommend focusing the discussion on the concentrations of elements/ions in the pore water or overlying water that would be active in the reactions.	
Appendix K4.24	K4.24.5 Instream Flow Modelling Results	Figure K4.24.1 and Figure K4.24.2	The limitations of PHABSIM as the modeling tool to represent fish habitat remains a significant issue in the PFEIS, because PHABSIM modeling is generally limited to discharge, and does not take into account other variables related to fish habitat, such as water quality and food chain effects. This issue has repeatedly been identified to the Corps over the course of the 2008-2009 Technical Working Group meetings, in EPA's July 2019 comments on the DEIS, and during the November 2019 Technical Meetings. Neither the DEIS or the PFEIS disclose the model domain, domain processes considered, the suite of metrics considered, delta of the metrics of those quantified to defend an impact determination, or what represents substantive or meaningful biological change from the project. Based on PHABSIM flow modeling, Figure K4.24.1 depicts that most habitat units won't be decreased by the project, which is not supported. Further, the figure discloses information from only the mainstem and not tributaries and off-channel habitat, so this is not a complete depiction of the potential impacts from the project. In addition, we note that Figure K4.24.2 is confusing because it presents this information over five different timeframes.	We continue to recommend revising the analysis of impacts to fish habitat, and recommend revising the figures to present clear and accurate information. Model selection should be based on what is trying to be understood relative to alterations and impacts to fish and fish habitat (Railsback 2016, Fisheries, 41:12). Because PHABSIM fish habitat modeling has limitations, EPA recommends the following guidance documents be considered for model selection, development, and reporting of model uncertainties and sensitivities: CREM model application guidance: https://www.epa.gov/sites/production/files/2015-04/documents/cred_guidance_0309.pdf QAPP (model development/ application planning) guidance: https://www.epa.gov/sites/production/files/2015-06/documents/g5m-final.pdf In addition, examples of ecological models include: •matrix models such as, https://pubs.usgs.gov/of/2018/1056/ofr20181056.pdf, https://swfsc.noaa.gov/uploadedFiles/Events/Meetings/Fish_2015/Document/10.1_Zabel_et_al_2013.pdf, etc. •Individual-based models such as hexsim (used for coldwater refugia): https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NHEERL&dirEntryId=338421 •Mechanistic viable population models such as EDT: https://www.nwcouncil.org/sites/default/files/Vol._VI_Ch._6_EDT_Application.pdf •There are also regional or watershed specific statistical models. We are not recommending any particular model, but are providing examples of models that go beyond flow and channel characteristics in order to address limitations in the PHABSIM model. In addition, we recommend that the FEIS discuss how model limitations, sensitivities, and uncertainties impact model outputs and FEIS conclusions.	
Appendix K4.24	K.24.4 Mercury/methyl mercury	K4.24- 5-8	The PFEIS acknowledges that bioaccumulation of methylmercury in fish is problematic for fish consumption.	We recommend disclosing the potential consequences to sport, commercial, subsistence consumers and to the economy of the fishing fleet from bioaccumulation of methylmercury in fish tissue.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix K4.24	K24.4 Mercury	K4.24-5	We appreciate the additional information that has been added regarding the potential for Mercury methylation. Regarding the statement in the PFEIS that "ADEC's water quality criterion of 0.77 µg/L for mercury is based on the EPA's recommended water quality criterion that is considered protective of the aquatic life, including invertebrates and fish," we note that the Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances, May 15, 2003, states that, "the previously approved aquatic life criteria for mercury (2.4 ug/l acute and 0.012 ug/l chronic, both as total recoverable)... will remain the applicable CWA standards." To our knowledge, there have not been any contemporary mining projects that have referenced the 770 ng/L value referred to here. Most use 12 ng/L. Examples of this are the EIS's associated with the Donlin and Greens Creek Mines in Alaska, and the Stibnite Mine in Idaho. The 770 ng/L value is elevated such that concentrations in this range are rarely observed, even downstream of contaminated sites. Many Superfund Sites where Hg is the primary contaminant of concern have water column concentrations of Hg that are <10 ng/L, but fish MeHg concentrations that are >0.3 ug/g. Please see specific examples as part of the Black Butte Mine Superfund Site, OR; the Klau/Buena Vista Superfund Site, CA, and Lake Onondaga Superfund Site, NY as a few examples where this is the case. Even if the 12 ng/L water quality criteria is used, this concentration does not guarantee that fish-tissue MeHg concentrations will remain below 0.3 ug/g. In fact, the vast majority of waterbodies where fish Hg concentrations exceed 0.3 ug/g occur where water-column concentrations are lower than 12 ng/L. In short, the 770 ng/L Hg criteria value mentioned here is several orders of magnitude above regulatory values that are being applied in other contemporary regulatory contexts, including NEPA.	We recommend using the State of Alaska's Aquatic Life Water Quality value of 12 ng/L instead of 770 ng/L. Or alternatively (and preferably), a site/region-specific water quality value can be determined, based on the 0.3 ug/g MeHg fish tissue criterion back-translated into a water-column Total Hg concentration. When the translation from fish tissue to water column is calculated, Total Hg concentrations are often in the 1-2 ng/L range.	
Appendix K4.24	K4.24.4 Mercury	K4.24-6	Regarding: "Human population at the highest risk due to methylmercury is the children of women who consume large amounts of fish and seafood during pregnancy due to its neurotoxicity. EPA's recommended fish tissue methylmercury criterion for the protection of human health is 0.3 mg/kg." We disagree with this statement that the 0.3 mg/kg fish tissue value is associated with "women who consume large amounts of fish." The 0.3 mg/kg criteria is based on a fish intake rate of 17.5 grams per day, based on national U.S. data. In the Pacific Northwest, fish consumption rates are much higher than the national average. For example, 175 grams per day is used in the State of Oregon to be more representative of people who consume large amounts of fish. Using these higher fish consumption rates results in the acceptable amount of Hg in fish tissue dropping by an order of magnitude to 0.03 or 0.04 mg/kg.	We recommend that a fish tissue criteria value that is protective of women who consume large amounts of fish be utilized as part of the FEIS. Several studies, and Pacific Northwest states in particular, have concluded that the 17.5 grams per day national fish consumption rate and the national 0.3 mg/kg fish tissue methylmercury criterion/ water quality standard are not representative or protective of frequent fish consumers.	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "The dominant species of mercury transported by surface water are particulate associated with inorganic mercury, small complexes, or adsorbed to colloids and methylmercury (Flanders et al. 2010)." The Flanders et al., (2010) reference is not in the Chapter 9 References. The Flanders et al., 2010 paper is based on data from the South River in Virginia, which has been severely impacted by point source releases of mercury from historical industrial sources. The speciation of mercury in water is not the same in all waterbodies. Many waterbodies have the majority of the Hg in the (operationally defined) dissolved phase, unless they are directly impacted by an industrial source - in which case the particulate fraction often becomes more important.	There are multiple studies of Hg speciation in rivers that are more applicable to the potential impacts in the Bristol Bay watershed than from the South River, Virginia, and we recommend that alternative studies be referenced in the FEIS, such as the following examples: Rolfhus KR, Wiener JG, Haro RJ, Sandheinrich MB, Bailey SW, Seitz BR. Mercury in streams at Grand Portage National Monument (Minnesota, USA): Assessment of ecosystem sensitivity and ecological risk. Science of the Total Environment 2015; 514: 192-201. Stoken OM, Riscassi AL, Scanlon TM. Association of dissolved mercury with dissolved organic carbon in US rivers and streams: The role of watershed soil organic carbon. Water Resources Research 2016; 52: 3040-3051. Vermilyea AW, Nagorski SA, Lamborg CH, Hood EW, Scott D, Swarr GJ. Continuous proxy measurements reveal large mercury fluxes from glacial and forested watersheds in Alaska. Science of the Total Environment 2017; 599: 145-155.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix K4.24	K4.24.4.1	K4.24-6	Regarding:" Separate evaluation of predicted change in surface water quality from project-related dust deposition (see Table K4.18-18 and Table K4.18-19) was not estimated due to generally nondetect mercury concentrations in the baseline data." For environmental Hg analysis, EPA method 1631 has a detection limit of 0.5 ng/L. However, there are other methods used to sample Hg in water that have much higher detection limits (i.e., 200 ng/L). Therefore, saying that the mercury concentrations are not detected, or "nondetect", could mean that concentrations are <200 ng/L or <0.5 ng/L. It is worth noting that earlier in the document, the outflow from the WTP is predicted to be 0.016 ng/L, so there did not seem to be an issue with low detection limits.	We recommend that the FEIS indicate the detection limit. We recommend providing text addressing why there were specific issues with measuring Hg in surface water at low concentrations in this part of the FEIS, compared to other sections where very low concentrations are predicted/reported. We further recommend using the reporting limit value of 0.5 ng/L as the concentration for Hg values in surface water and evaluating Hg impacts from fugitive dust, as this would provide more information on the environmental impacts than not providing any estimate.	
Appendix K4.24	K4.24.4.1	K4.24-6	Regarding: "However, the MSR process results in the formation of sulfide, which strongly limits mercury bioavailability (Paquette and Helz 1997)." We note that the relationship between Hg bioavailability, methylation, and sulfide is complex. It is not accurate to state that sulfide strongly limits MeHg production.	We recommend re-wording as follows: The MSR process results in the formation of sulfide, which can impact the Hg bioavailability and the amount of MeHg produced.	
Appendix K4.24	K.4.24.1	K4.24-6	Regarding: "These dual effects of sulfate on mercury methylation is further influenced by various site-specific conditions (such as nitrate, organic carbon, pH, and mercury). Therefore, the relationship between sulfate loading and methylmercury production is often too complex to be able to predict the production of methylmercury in a system." We find that the question is not: "if we increase sulfate, but decrease organic carbon, adjust the pH and change the Hg concentration, how will this impact MeHg production?" This would indeed be difficult to quantify. The question is actually simpler: "If we keep the same environmental conditions (same Hg, pH, carbon, etc), but we increase the amount of sulfate (in a system that already has low existing sulfate), is this likely to increase MeHg production?" We note that the answer to that question is not very complex - it is highly likely that increased sulfate loading will increase MeHg production. This conclusion is based on many previous studies where, all other things being equal, increases in sulfate typically increase MeHg production. In general, the dominant perspective in the scientific literature suggests that increases in sulfate would result in a increase in MeHg production.	We recommend revising the conclusion that methylation is too complex to predict the impact of sulfate loading and disclose the conclusion in the scientific literature that increases in sulfate would typically increase MeHg production.	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "If mercury is sufficiently bioavailable in these environments, only then methylmercury is formed as a co-metabolic product of the MSR process. Under this premise, project related changes in sulfate and mercury loading (from wastewater treatment plants) to the study area surface waterbodies would not be expected to cause appreciable environmental impacts beyond the baseline with respect to increased methylmercury production." We note that the conclusion that increased loading of Hg and sulfate will not result in any increased MeHg production is based on information presented in the paragraphs following this statement, and referenced in the comments below. We disagree with the conclusion that MeHg production will not increase, based on significant concerns with the accuracy of the information presented.	We recommend revising this conclusion in the FEIS, with details supporting this recommendation provided in the following comments, and recommend that impacts and consequences to fish from increased MeHg production be disclosed.	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "The baseline data for sediment and surface water in the project area waterbodies are generally indicative of aerobic/oxidizing conditions that are not conducive to mercury methylation via MSR." While we agree that surface water is aerobic and oxidizing, we do not agree that the sediment in the project area is aerobic and oxidizing. A review of the baseline data QAPP indicates that the dissolved oxygen content and oxidation-reduction potential (ORP) were not measured. Therefore, there is no analytical basis to support the conclusion that sediments were aerobic and oxidizing. In general, most sediments contain anoxic and reducing conditions—this is commonly encountered throughout Alaskan waterways.	We recommend that the FEIS support statements indicating that there is something unique about the sediments surrounding and downstream of the Pebble project that would cause aerobic and oxidizing conditions, by providing a robust dataset supporting this conclusion.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "Presence of dissolved oxygen (DO) and positive oxidation/reduction potential (ORP) in surface water and absence of acid volatile sulfide (AVS) in sediments are indicative of aerobic/oxidizing conditions that are not conducive to the activity of SRBs and mercury methylation via MSR." We disagree with this statement. The detection limit for AVS is relatively high. This is a very difficult parameter to measure at environmentally relevant concentrations. According to the QAPP, the detection limit for AVS is 0.5 mg/kg. This is an acceptable laboratory detection limit, but when AVS is <0.5 mg/kg it does not mean that AVS is absent. In terms of Hg biogeochemistry, sulfide levels below this are relevant, since Hg and MeHg typically occur at concentrations an order of magnitude lower. It is also important to acknowledge that the absence of detectable AVS does not mean that sediment conditions are oxidizing and oxygen is present. If sulfate levels are low, then AVS would not be detected, but conditions could still be anoxic and reducing.	We recommend removing this statement from the FEIS.	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "In sediments collected during June to September, AVS was detected infrequently (only in 26 percent of the samples), and at low median concentrations of 0.35 mg/kg (see EBD Table 10.2-2)." We note that an important piece of information not included here is that AVS was only measured at 34 locations. In contrast, most other metals/constituents were measured at 197 locations. Therefore, the conclusions being drawn from the AVS samples are based on a much smaller dataset than was included for other baseline constituents. Because the PFEIS is using the AVS data to suggest that the project will not impact MeHg concentrations, it is critical to acknowledge that only a small subset (i.e., 17%) of the sediment samples were actually analyzed for AVS. The rationale for why 83% of the sediment samples were not analyzed for AVS is not included and there is not any discussion of whether the small dataset of AVS samples is representative of site-wide conditions. In addition, a detection of AVS in 26% of the samples seems relatively high and is contradictory to previous statements indicating that sediments were aerobic and oxidizing. Clearly, a quarter of the sediments sampled had significant AVS measured. In terms of Hg methylation, it is important to acknowledge that methylation is spatially heterogeneous within a landscape. Not all sediments methylate Hg with equal efficiency. The findings that a quarter of the sediments have AVS >0.5 mg/kg suggest that there are locations within the region of the Pebble project that are highly conducive to methylation. In general, AVS in the 0.35 mg/kg range would suggest A) sulfate reduction is occurring at low levels throughout the landscape; and B) additional inputs of sulfate could stimulate SRB activity and increase MeHg production. These suggestions are inconsistent with the conclusion presented earlier that conditions are not conducive to methylation.	We recommend revising this text to more accurately present the information in the FEIS. We also recommend that the FEIS analyze and disclose the consequences and impacts to fish as a result, and discuss necessary mitigation measures to reduce those impacts.	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "Based on these observations that are reflective of generally aerobic/oxidizing conditions, mercury methylation via MSR, if any, is likely to be severely limited in the study area waterbodies, regardless of project-related incremental sulfate loading." Based on the information provided in our comments above, we believe the opposite to be the case. There are clearly sediments within the project area with reducing conditions (e.g. AVS >0.5mg/kg in 26% of the samples). AVS <0.5 mg/g in 74% of the samples does not indicate these sediments are aerobic and oxidizing (also, there was not any data collected to support this). A conservative assumption would be that sediments throughout the project area are anoxic and conditions are capable of supporting MeHg production.	We recommend that this conclusion be revised in the FEIS, based on the data provided, and that the impacts to fish be fully disclosed.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "Presence of nitrate in the study area rivers and lakes is also more indicative of aerobic conditions. Nitrate/nitrite was detected at frequencies of 60 to 88 percent, with concentrations ranging from 0.021 to 6.74 mg/L in the rivers and 0.032 to 1.19 in the lakes (see EBD Tables 9.1-5 through 9.1-7, and Tables 9.1-31 and 9.1-32)." While not clearly stated in the PFEIS, we assume this statement is in reference to water samples. We note that mercury methylation is not expected to occur in oxic water, and is more likely to occur in the anoxic sediment.	We recommend revising this statement, as the presence of nitrate in the water column is not sufficient evidence to suggest that conditions in the sediment are not conducive to methylation.	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "Mercury methylation in aquatic systems typically peaks during summer months, primarily reflecting temperature dependence of microbial activity, because they have optimal temperature range for growth, typically 27 to 30 degrees Celsius (ºC) (Sawicka et al. 2012). The median temperature in the project area rivers range from 1.85 to 2.77ºC, with a slightly warmer median of 11.6ºC in lakes; in the summer, maximum temperatures of 15.7 to 23.5ºC have been recorded in these rivers and lakes (see EBD Tables 9.1-5 through 9.1-7, and Tables 9.1-31 and 9.1-32). Therefore, increased mercury methylation via MSR may be restricted to a limited period during the summer months." We do not recommend using the temperature of the region to support the idea that this area is not conducive to Hg methylation. Elevated levels of MeHg have been observed throughout arctic, subarctic, and boreal ecosystems in hundreds of studies, with sufficient methylation to cause elevated fish tissue MeHg concentrations in sediments that rarely exceed 4º C. If methylation was restricted to areas with temperatures of 27-30 º C, then MeHg in fish would not be an issue throughout much of North America. However, fish consumption advisories for MeHg occur in waterbodies throughout all 50 states—even in areas with low temperatures, such as Alaska. The conclusion here that the mine project will not impact MeHg production because the temperatures are low is inaccurate.	We recommend that this conclusion be revised in the FEIS, given that the temperatures in the Region do not preclude MeHg production from occuring and that the mine will likely increase MeHg production in the project area.	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "Presence of selenium is known to inhibit mercury methylation, primarily through limiting mercury bioavailability by forming insoluble selenite species (Jin et al. 1997; Chen et al. 2001; Truong et al. 2013). Selenium was detected at higher frequency and concentrations than mercury in the study area sediments: selenium was detected in 68 percent of the samples at 0.018 to 13.1 mg/kg, whereas mercury was detected in 57 percent of the samples at 0.011 to 0.42 mg/kg (see EBD Table 10.2-2). Therefore, presence of selenium may inhibit mercury methylation by limiting its bioavailability." We note that significant levels of Hg methylation have been observed to occur in areas with similar (or higher) Se levels than presented here. The argument presented here that the mine project will not impact MeHg production because Se concentrations are elevated appears to be inaccurate.	We recommend that this conclusion be removed from the FEIS.	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "At these levels, iron can interact with sulfur species and may decrease methylmercury production in the limited anaerobic environments that may be present in the study area waterbodies. This decrease may occur by shifting microbial assemblage from SRBs to iron-reducing microbes with less mercury methylation capacity (Lovley and Phillips 1986) and by altering mercury bioavailability via interaction with sulfur species (Mehrotra and Sedlak 2005)." Information provided in the PFEIS does not clearly support this statement. In general, it is correct that IRB and SRB can both methylate Hg; however, bulk sediment Fe concentrations are not representative of Fe available to IRB. It is extremely common for bulk sediment Fe levels to be in excess of sulfate levels, but this often does not indicate that the conditions will not be supportive of methylation by SRB.	We recommend that this information be clarified and supported in the FEIS or alternatively, removed.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "Organic carbon (OC) in sediments and surface water (in dissolved form) has a major influence on metal speciation and bioavailability. Generally, OC renders mercury less bioavailable for methylation."	We recommend revising this statement for accuracy, as data does not support the conclusion that organic carbon renders Hg less bioavailable. Hg bound to organic matter is likely some of the most bioavailable forms of Hg to bacteria, though the relationship between Hg bioavailability and organic carbon is complex and is not fully understood or agreed upon in the literature.	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "As the total OC (TOC) range (0.13 to 32.3 percent) indicates, sporadic organic-rich locations are not uncommon given the geographic extent of the study area, but the median sediment TOC of 1.77 percent (see EBD Table 10.2-3) and dissolved OC (DOC) range of 0.16 to 8.18 mg/L (see EBD Tables 9.1-5 through 9.1-7) are generally not indicative of organic-rich conditions that generate strongly reducing environments and induce SRB activity."	The organic carbon data presented here indicate that there is sufficient carbon in bulk samples and in the dissolved phase to support methylation. There are numerous examples of methylation occuring in areas with similar carbon values. We recommend revising the conclusion that conditions are not conducive to methylation, which is not supported by carbon data presented.	
Appendix K4.24	K4.24.4.1	K4.24-8	Regarding: "At these concentrations, sulfate is not likely to be deficient, or the rate-limiting factor for MSR in these waterbodies." We note that a large range in sulfate concentrations in sediment are presented in the PFEIS (from 0.5 to 2600 mg/kg). This information suggests that there are some areas where sulfate is rate limiting and other areas where it may not be. It is inaccurate to make the overarching statement that sulfate is not limiting in the Pebble area. There are some areas where it is likely limiting and others where it is not. We recommend that a more accurate conclusion would be that additions of sulfate from the Pebble project would likely increase SRB activity in some areas, but in areas where sulfate is not limiting, it may not have an impact.	We recommend revising the conclusion that, because sulfate is not limiting everywhere in the area, additional sulfate additions from the project will not increase methylation anywhere in area. The impact of sulfate additions on MeHg production will likely be spatially variable, with some areas impacted and others not impacted.	
Appendix K4.24	K4.24.4.1	K4.24-9	Regarding: "In addition, concentrations of total mercury in effluent discharges are expected to be 0.001 µg/L (which is 770 times below the ADEC water quality criterion of 0.77 µg/L)."	Earlier in this document, the PFEIS states that effluent Hg concentrations will be 0.016 ng/L, while here it states that concentrations will be an order of magnitude higher, at 1 ng/L. We recommend that the FEIS reconcile these differences. Furthermore, we note that the applicable WQC value is 12 ng/L, not 770 ng/L. See our earlier comment on this point at row 78.	
Appendix K4.24	K4.24.4.1	K4.24-9	Regarding: "Overall, site-specific geochemical conditions in the study area are generally not conducive to methylmercury production via MSR." From the baseline data report, MeHg concentrations were not measured in water or sediment. Therefore, the statement that the study area is not conducive to methylation is speculative and not based on data. As mentioned in comments above, processes of MeHg production are complex and difficult to predict. However, without any data on MeHg, the PFEIS is predicting that the conditions are not conducive to methylation—even though there is sufficient organic carbon, sufficient sulfate, and reducing conditions occurred (i.e. AVS detected) in at least a quarter of the samples where it was measured.	We recommend that the FEIS be more conservative and more accurate with the conclusions regarding impacts from the project on MeHg production, rather than making broad assumptions about temperature, iron, organic carbon, selenium, etc.	
Appendix K4.24	K4.24.5, Instream flow modeling results	K4.24.5- 10	As mentioned in comments above, we continue to be concerned that the PFEIS presents flow as being the sole indicator of fish habitat and uses it to calculate increases and decreases in habitat as a result of the project.	We recommend that the FEIS disclose and account for the full suite of parameters that play into calculations of increases and decreases in fish habitat.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.22 Wetlands and Other Water/Special Aquatic Sites	3.22.5	3.22-9	The PFEIS continues to identify certain wetlands as “regionally important” based on a few general characteristics, including whether they provide habitat for regionally important fish (without identification of any specific fish species). Appendix D indicates this analysis was refined relative to the DEIS and the five wetland classes considered regionally important are identified. Culturally important wetland plants are identified, although no wetland classes are identified as regionally important due to the presence of these plant species. Section 4.22.2 states that "impacts to culturally important plants (a subset of regionally important wetlands) and riffle and pool complexes cannot be quantified, because these resources were not explicitly or consistently identified during baseline mapping." The purpose of identifying “regionally important”wetlands and how this identification is incorporated into the impact analysis is not clear. Similarly, the criteria for which wetland classes might be regionally important is not explained, and is not based on a functional analysis or on regulatory parameters. All wetlands are considered “special aquatic sites” under the Guidelines, and Corps regulations identify “wetlands considered to perform functions important to the public interest.” Other wetland classes providing the same functions or with the same characteristics are not identified as regionally important. For example, slope and flat wetlands are not identified as regionally important even though they meet the general criteria set by the PFEIS for inclusion in this category.	EPA continues to recommend that the Corps not use this “regionally important” approach; however, if different habitats are to be classified as “regionally important,” we recommend that the classification approach be clear when and why a habitat is designated as such. For example, determinations regarding the importance of aquatic resources could be based on an analysis of the functions provided by each of the aquatic resource types that would be lost or degraded due to impacts from the project. Further, when the "regionally important" approach is used, we recommend applying it to all aquatic resources, including streams, lakes, and ponds and that all aquatic resources providing the same functions or with the same characteristics be identified as regionally important. Additionally, site-specific vegetation data from the wetland delineation forms could be used to identify the wetlands supporting the plant species identified as culturally important, and that any assessment of regional importance consider that affected aquatic resources occur within functionally-connected complexes that amplify the provision of functions by individual wetland classes and aquatic resources. We recommend the Corps clarify and update all relevant sections in the FEIS.	
3.22 Wetlands and Other Water/Special Aquatic Sites	3.22.7	3.22-12	It is not clear in the PFEIS why only some, but not all, aquatic resource features and associated functions are discussed. For example, there is no discussion on specific stream reaches, lakes, or ponds and their associated functional losses, unless they provide fish habitat. Chapter 3.22 addresses riverine and lacustrine fringe wetlands but does not speak to open water habitats including streams, lakes, and ponds. Section 3.22.7 does not attribute functions or values to these habitats. Chapter 3.16, Surface Water Hydrology, only addresses floodplain function and values. Section 3.22.7 attributes riverine wetlands as providing "floodwater storage," but does not attribute other wetland classes located within floodplains with this function. Streams, lakes, and ponds that provide fish habitat are identified in Chapter 3.24, Fish Values.	We continue to recommend that the FEIS characterize the full array of functions currently performed by the potentially affected streams, lakes, and ponds, as well as the degree to which they are currently performing each function. We recommend that the attribution of functions and values in section 3.22.7 should be for all aquatic resources not just wetlands.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.22 Wetlands and Other Water/Special Aquatic Sites	Table 3.22-3	3.22-14	We are concerned that the discussion in Section 3.22.7 is not a robust attribution of wetlands functions and values. Tables 3.22-3 and 3.22-4 in the PFEIS present wetland functions and values, respectively, by HGM class for wetlands in the analysis area. These new tables and Section 3.22.7, discussing functions and values, are partly in response to our previous comment number 418; however, we note that the discussion does not utilize site-specific data. Section 3.22.7 also does not explain how the functions and values were selected, and it provides limited information about how specific functions and values were attributed to wetland classes. The performance of 8 wetland functions was quantitatively assessed during the 2004-2008 wetland mapping and delineation. Section 3.22.7 attributes 10 functions but doesn't include the hydrologic function "modification of streamflow" or the biogeochemical function "export of detritus" which were part of the original assessment. Table 3.22-3 fails to identify that slope wetlands also provide the following functions: 1) Maintenance of plant community and 2) Provision of terrestrial species habitat. The later function is discussed on page 26 of the draft compensatory mitigation plan, which states that: "Slope wetland HGM palustrine scrub-shrub and emergent wetlands are the most widely distributed aquatic resource in the watershed with approximately 20,769 acres and 8,911 acres respectively. These wetlands are broadly used by ungulates such as moose and caribou." Citations within Section 3.22.7 are to undated NRCS technical notes that are not always applicable. For example, the citation to the discussion of Flats wetlands includes both mineral and organic soil wetlands, but attributes functions and values based on the characteristics of nutrient-poor, precipitation-driven bogs. Nutrient-rich, groundwater-driven fens also occur in the analysis area and	We recommend that Section 3.22.7 in the FEIS provide more information on the selection of specific functions and values, and then attribute those functions and values to specific HGM wetland classes. We recommend identifying why the "modification of streamflow" and "export of detritus" functions assessed in the field during baseline mapping were not included in the attribution. We recommend correcting erroneous information (e.g., stating that Flats wetlands lack groundwater inputs when fens are identified as regionally important partly due to groundwater inputs) within the document. Further, we recommend that the attribution of functions and values be applied to all aquatic resources, including streams, lakes, and ponds, and that attribution use the available site-specific data, including landscape position, vegetation, wildlife occurances, and subsistence use, where attributions apply to all aquatic resources. We further recommend that function and value attribution reflect that project-area wetlands occur in complexes where multiple HGM classes and open water habitats occur together and amplify the provision of certain functions and values. This comment is intended to ensure adequacy of the analysis of impacts to wetland functions and values for NEPA purposes and to help improve and inform the 404 analysis that is integrated into the EIS. EPA's PFEIS comments do not constitute all of EPA's Section 404-related comments, which are the topic of ongoing discussions between EPA and the Corps.	
3.22 Wetlands and Other Water/Special Aquatic Sites	Table 3.22-3	3.22-14	It is not clear in the PFEIS why Table 3.22-2 doesn't include the following functions for flat wetlands: cycling of nutrients and compounds.	We recommend that the Corps clarify and/or update the table and relevant text, as appropriate, in the FEIS.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.22 Wetlands and Other Water/Special Aquatic Sites	Table 3.22-4	3.22-15	It is not clear in the PFEIS why Table 3.22-4 does not include the following functions for slope wetlands: recreation and subsistence. It is also not clear why there is not a broader discussion on the functions provided by slope wetlands in Section 3.22.7. For example, slope wetlands can provide high-quality habitat for numerous fish species and contribute water, nutrients, organic material, macroinvertebrates, algae, and bacteria downstream to higher-order streams in the watershed. They also moderate groundwater discharge and surface and subsurface flows to other wetlands and support stream base flows, which all act to support fish habitat. (Slope wetland functions include: maintenance of plant community and provision of terrestrial species habitat. Further, the slope wetlands in the NFK, SFK, and UTC watersheds perform these functions due to the high level of hydrologic connection between streams, wetlands, lakes, and ponds in the area.	We recommend that the Corps clarify and/or update the table and relevant text, as appropriate, in the FEIS.	
3.22 Wetlands and Other Water/Special Aquatic Sites	Table 3.22-5 and the similar table for the other alternatives	3.22-19	Tables 3.22.5, 3.22.13, and 3.22.17 are new. They replace pie-chart figures from the DEIS which provided percentages and did not show regionally important wetlands or special aquatic sites. The tables are preferable to the pie charts they replaced, but we are concerned that they are misleading because they treat wetlands separately from other special aquatic sites. This suggests that wetlands are not special aquatic sites, which is inconsistent with applicable regulations and text in the earlier sections of this chapter. These tables are also confusing because they provide information by artificial categories without context. All wetlands are special aquatic sites. The Tables only identify mudflats and vegetated shallows, which are non-wetland special aquatic sites. Riffle and pool complexes are also special aquatic sites affected by the project that were not mapped and are not reported in the Tables. Some wetland types (but not open water habitats) are identified as being regionally important while other wetlands meeting the criteria are not identified as being regionally important. The Tables also report acres and percentages within the analysis area but do not explain the significance of these percentages. For example, Table 3.22-5 identifies that the wetlands and other waters comprise 22% of the analysis area, which is a buffered impact footprint. It is not clear that the PFEIS provides agency decision makers and the public with the meaning behind this 22% metric. Similarly, the relevance of presenting that mudflats comprise less than 1% of the analysis area or that 100% of this resource type in the analysis area will be impacted is not clearly disclosed. Separately, percentages are used in chapters 3.22 and 4.22, although the analytical scales are different. The result is that the tables in chapter 3.22 do not match the tables in chapter 4.22.	We recommend that the Corps clarify and/or revise the tables in the FEIS to reflect that wetlands are special aquatic sites. If the District considers it beneficial to highlight impacts to non-wetland special aquatic sites, we recommend identifying them as non-wetland special aquatic sites. For clarity, we recommend riffle and pool complexes be included in the Tables even if the impacts to these special aquatic sites have not been quantified. Finally, we recommend sections 3.22.8, 3.22.9, and 3.22.11 of the FEIS be expanded to explain why the information on percentages of the analysis area is being presented and how this information be interpreted. This comment is intended to ensure adequacy of the analysis of impacts to Special Aquatic Sites for NEPA purposes and to help improve and inform the 404 analysis that is integrated into the EIS. EPA's PFEIS comments do not constitute all of EPA's Section 404-related comments, which are the topic of ongoing discussions between EPA and the Corps.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.22 Wetlands and Other Water/Special Aquatic Sites	3.22.8.1	3.22-20	If Figure 3.22-2 is to show the area in which field-verified mapping was conducted, the figure may be mislabeled.	We recommend that the Corps clarify and/or update the figure, as appropriate, in the FEIS.	
3.22 Wetlands and Other Water/Special Aquatic Sites	3.22.12	3.22-45	It appears that Sections 3.16 and 3.22 may provide conflicting information for Long Term Climate Change. In Section 3.22, warmer and wetter conditions seem to be taken as a given. However, in 3.16 it states that "there has not been a significant trend in precipitation." (p 3.16-24).	We recommend that the Corps clarify and/or update the text in the FEIS, as appropriate, to present a consistent view on potential climate-related changes in the region.	
3.22 Wetlands and Other Water/Special Aquatic Sites	3.22.12	3.22-45	It is not clear what conclusions can be drawn from the statement that "Both wetland drying and the increased frequency of warm, dry summers and associated thunderstorms have led to more large fires in the last 10 years than in any decade since recordkeeping began in the 1940s (Kasischke et al. 2010). Wildland fires with burn intensities and depths capable of consuming vegetation and peat have the potential to significantly alter wetland function and hydrology." This statement appears to suggest that wildfire in the area could be an increasing threat, however, the potential impacts on and/or risks for the mine are unclear.	We recommend that the Corps clarify and/or update the text, as appropriate, in the FEIS to more fully assess potential impacts due to wildfire.	
4.22 Wetlands and Other Water/Special Aquatic Sites	4.22.2	4.22-1	It is not clear how the magnitude and levels of impact intensity will be assessed or what the impacts are for the project. For example, the text identifies six considerations, including: 1) the number of acres or miles of impact (which appears to be similar to "extent" which is its own factor); 2) the aquatic resource type; 3) the relative abundance of the resource in the watershed; 4) the location of the resource in the watershed; 5) the perceived importance of the resource; and 6) the percent of the total watershed area. Considerations number 2 and 5 appear to reflect whether the resource is a special aquatic site or identified as "regionally important," respectively. It is not clear that considerations number 3 and 4 are being evaluated (the wetland analysis area is the buffered project footprint, not the entirety of the watershed). Text on page 4.22-2 suggests that considerations number 3 and 6 are the same. Also, the EPA 2018d citation may not support the notion that "the magnitude of impact is also evaluated at the watershed level as a percent of the total watershed area."	We recommend the discussion at 4.22.2 of the FEIS be revised to identify the different levels of impact magnitude and explain how each of the considerations are being used to identify the magnitude of various project impacts.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.22 Wetlands and Other Water/Special Aquatic Sites	4.22.2	4.22-1	This section states that "magnitude of impact also relates to the perceived importance of the resource; metrics for the definition of regionally important wetlands and special aquatic sites are discussed in Section 3.22, Wetlands and Other Waters/Special Aquatic Sites." As discussed in our comments above on Section 3.22, we are concerned that slope and flat wetlands are omitted from the regionally important wetland list, and, in some places, wetlands are omitted all together from lists of special aquatic sites.	Similar to our comments above on Section 3.22, we recommend that wetlands not be omitted from lists of special aquatic sites. If the FEIS continues to use the concept of regionally important wetlands, we recommend that slope and flat wetlands be added to the list of regionally important wetlands, because they meet the general criteria set by the PFEIS for inclusion in this category.	
4.22 Wetlands and Other Water/Special Aquatic Sites	4.22.2	4.22-2	The explanation of watershed estimation methods is confusing. The PFEIS states: "Watershed Estimation Methods—Because the significance of impacts to wetlands and other waters is dependent on both the type and its relative abundance in a watershed, area of impacts to a given type of wetland or other water is also presented as a percent of the total watershed area. Estimation of wetland abundance by watershed was made at the US Geological Survey Hydrologic Unit Code (HUC) Tenth Level (HUC 10) (Figure 4.22-1). The acreages and percentages of wetlands and other water types for each watershed should be considered an approximation for comparison purposes only." This text suggests that percent of watershed area of "a given type of wetland or other water" is being used as a surrogate for the other impact magnitude considerations. As noted in a previous comment, however, Section 4.22.2 does not identify different levels of impact magnitude, intensity, or significance. Also as noted previously, this Section does not provide an explanation for this approach to agency decision makers and the public. It does not identify how the watershed scale was selected, how the percent of watershed area influences impact magnitude, or how this information should be interpreted. For example, if a given wetland type is 1% of a watershed and the project impacts 100% of that wetland type, is the impact magnitude greater or less than if that wetland type was 2% of the watershed area and the project impacted 50% of it? We note that EPA 2018d concludes that this kind of approach to impact evaluation is inappropriate because such evaluations "cannot be determined solely on a single arbitrary threshold at a single arbitrary scale" as is being done in the PFEIS.	We recommend that the discussion of watershed estimation methods in the FEIS better explain this approach to assessing impact magnitude, including why it was selected and the meaning of the reported watershed percentages. We recommend the FEIS evaluate and disclose the magnitude of the direct, indirect, and cumulative impacts to aquatic resources by assessing the measurable environmental consequences of project-related changes to the affected environment. Potential approaches include: using available site-specific information to attribute the functions currently performed by all aquatic resources potentially affected by direct, indirect, or cumulative effects; quantifying the geographic extent of direct, indirect, and cumulative effects using the best available data (e.g., groundwater, streamflow, and dust dispersion models developed for the project, wildlife and fish occurances, and subsistence use); quantifying the degree of functional impact from specific changes (e.g., elimination via fill, fragmentation, fugitive dust, dewatering, streamflow changes, including to chemistry and temperature); using a landscape approach that considers the inter-related nature of the variety of aquatic resources and how they connect to adjacent aquatic resources and uplands (including downstream); analyzing impacts at ecologically-meaningful scales (scales at which functional processes such as habitat provision occur); and carrying impact analyses to receptors of interest (e.g., WTP discharges that do not exceed WQS can still negatively impact fish egg incubation, alter homing behaviors, increase contaminant loading in organisms, or reduce community confidence in the safety of subsistence resources).	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.22 Wetlands and Other Water/Special Aquatic Sites	4.22.3	4.22-5	The PFEIS states that all "unavoidable and permanent adverse impacts to wetlands and other waters would be compensated for through mitigation" and refers to a draft CMP that includes no compensation for impacts to more than 2,200 acres of wetlands. We recommend that the EIS be revised to state how compensation for unavoidable impacts will be provided, or alternatively explaining why compensation is not being provided for these unavoidable impacts.	We recommend that the Corps clarify and/or update text in the FEIS, as appropriate, to more fully discuss the proposed compensatory mitigation plan and how it complies with the 2008 Mitigation Rule. This comment is intended to ensure adequacy of the draft Compensatory Mitigation Plan for NEPA purposes and to help improve and inform the 404 analysis that is integrated into the EIS. EPA's PFEIS comments do not constitute all of EPA's Section 404-related comments, including on the draft Compensatory Mitigation Plan, which are the topic of ongoing discussions between EPA and the Corps.	
4.22 Wetlands and Other Water/Special Aquatic Sites	4.22.3	4.22-6	It is not clear how many acres of wetlands and other waters and miles of stream could be potentially fragmented by diversion channels, sediment ponds, and/or culverts. For example, the section describing the Indirect Effects of Fragmentation states the following assumption: "Aquatic resources for which hydrology would be maintained through diversion channels, sediment ponds, and/or culverts were not considered fragmented." The assumption assumes that blockages like sediment ponds do not effectively fragment habitat. This assumption could contribute to an underestimate of adverse impacts.	For clarity and transparency, we recommend revising the FEIS to document how many acres of wetlands, other waters and miles of stream could potentially be fragmented by diversion channels, sediment ponds, and/or culverts.	
4.22 Wetlands and Other Water/Special Aquatic Sites	4.22.3	4.22-11	For the indirect effects of dewatering in the Wetlands/Aquatic Resources section, it is not clear why the following assumption is made: “Wetlands and other waters for which the water level remained at or within 3 feet of the surface after the drawdown were not considered impacted, and removed from the selection.” That assumption may result an underestimate of indirect impacts.	We recommend that the Corps provide support/citations for the statement. Alternatively, we recommend development of a drawdown map with a "zero drawdown" isocontour. Wetlands and aquatic resources that fall within this polygon would represent those that could be adversely impacted by dewatering. In contrast, those outside the polygon would not be affected. Such maps could be made for both the low-K and high-K simulations. Wetlands and other waters within the polygon that would be lost due to the direct footprint impacts would not be included in the indirect impact tallies since those impacts would already have been accounted for in the estimates of direct losses.	
4.22 Wetlands and Other Water/Special Aquatic Sites	Table 4.22-2 and similar tables in this Chapter that refer to Special Aquatic Sites and Regionally Important Wetlands	4.22-20 and where similar analyses appear in this Chapter	As noted in previous comments on Section 3.22, EPA is concerned that references to Special Aquatic Sites do not include all types of wetlands, and slope and flat wetlands are not included in the list of regionally important wetlands.	We recommend revising these tables to add wetlands to special aquatic sites. If the EIS continues to use the concept of regionally important wetlands, we also recommend that slope and flat wetlands be added to the list of regionally important wetlands because they meet the general criteria set by the PFEIS for inclusion in this category. This comment is intended to ensure adequacy of the analysis of impacts to Special Aquatic Sites for NEPA purposes and to help improve and inform the 404 analysis that is integrated into the EIS. EPA's PFEIS comments do not constitute all of EPA's Section 404-related comments, which are the topic of ongoing discussions between EPA and the Corps.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.22 Wetlands and Other Water/Special Aquatic Sites	4.22.10	4.22-85	The cumulative effects section states the following: "The duration of indirect impacts is considered temporary when wetland or other water functions would be reduced during the construction phase only, and returned after construction ends." Due to the predicted length of construction, the impacts may be more than temporary and may be substantial. We recommend that impacts be reassessed based on type and duration or the document may result an underestimate of cumulative impacts.	We recommend that the FEIS be revised to clearly identify and disclose the type and duration of the impacts that are called "temporary".	
4.22 Wetlands and Other Water/Special Aquatic Sites	4.22.10.2	4.22-87	It appears that text and table information conflict. Text states: "the least cumulative effects to wetlands (10,686 acres) occur under the Applicant's Preferred Alternative." While Table 4.22-38 states: "The contribution to cumulative effects on wetlands and other waters is expected to be greatest under the Applicant's Preferred Alternative…."	We recommend clarifying or correcting these contradicting statements in the FEIS.	
4.22 Wetlands and Other Water/Special Aquatic Sites	4.22-38	4.22-89	This table indicates that "the Pebble Project expansion site would impact an additional 8,484 acres of wetlands and 228 miles of rivers and streams" at the mine site. However, it does not identify whether these additional impacts would be in the SFK, NFK, or UTC watersheds. In addition, it is not clear whether this total represents direct and indirect impacts or only direct impacts.	We recommend that the table be revised to clarify how much of these additional impacts would take place in the SFK, NFK, or UTC watersheds. In addition, we recommend that the table clarify whether these estimates include direct and indirect impacts and if they only include direct impacts explain why indirect impacts have not been estimated.	
4.22 Wetlands and Other Water/Special Aquatic Sites	4.22-38	4.22-93	It is not clear what the severity or significance of the estimated cumulative impacts are. For example, Table 4.22-38 states the following as its summary of project contribution to cumulative effects: "Overall, the contribution of the Applicant's Preferred Alternative to cumulative effects on wetlands and other waters, when taking other past, present, and reasonably foreseeable future actions into account, would permanently impact an estimated 0.6 percent of wetlands in the watersheds intersecting the Pebble Project expansion footprint." This section lacks an analysis of the severity or significance of the estimated cumulative impacts.	We recommend revising this section in the FEIS to include analysis and disclosure of the severity or significance of the estimated cumulative impacts.	
4.22 Wetlands and Other Water/Special Aquatic Sites	general comment		The discussion of direct impacts on page 4.22-21 recognizes that loss of wetlands and streams will have impacts downstream due to deprivation of inputs from these lost aquatic resources (i.e., water, nutrients, organic material, macroinvertebrates, algae, and bacteria). The January 2020 draft Compensatory Mitigation Plan also recognizes this type of indirect impact, stating: "Indirect effects, such as alterations to water flow and nutrient transport, could have further indirect impacts in downstream reaches of NFK River and South Fork Koktuli River in designated aquatic habitat for Chinook salmon, coho salmon, sockeye salmon, and chum salmon...". However, the degradation of downstream habitats was not quantified and evaluated as a category of indirect impact in this Chapter.	We recommend that the extent of downstream habitat degradation be quantified and evaluated in the FEIS as an indirect impact from the project.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Chapter 5 Mitigation	Table 5-2	General comment on Table 5-2	Our DEIS comments recommended that the EIS assess the effectiveness and jurisdiction/ enforcement of each of the Applicant's proposed mitigation measures (Table 5-2) as was done for the EIS recommended mitigation measures listed in Table M-1. NEPA guidance recommends that effectiveness and jurisdiction of mitigation measures be assessed, regardless of whether they are proposed by the Applicant. The PFEIS response to this comment (SOC response on pg. D-139) is that effectiveness and jurisdiction of each measure would not be useful, since these are integral components of the project, implementation would be probable, and that the Applicant's BMPs and industry standards are designed to comply with regulations and known to be effective. However, implementation of some of the Applicant's mitigation measures is not necessarily probable because some of them are voluntary measures. In addition, some of the Applicant's mitigation measures are not standard BMPs, such as the site-specific NP/AP ratio, the strategic water discharge system, aspects of the advanced water treatment processes, etc.	We continue to recommend that effectiveness and potential jurisdiction be assessed and disclosed for each potential mitigation measure, regardless of whether the mitigation is proposed by PLP or the Corps. We believe this will strengthen the quality of the EIS by disclosing the Corps' analysis of the Applicant's mitigation measures. Specifically, we recommend that a column be added to Table 5-2 titled "Assessment of Measure" (as was done in Table M-1) and the entries populated for each of the Applicant's proposed mitigation measures as follows: - If the mitigation is a commonly used BMP with well-known effectiveness, that can be simply stated. - If the mitigation is uncommon and/or mitigation effectiveness is challenging due to project-specific or site-specific conditions, we recommend that additional information in the FEIS is warranted. The effectiveness evaluation of many of these mitigations may be found in other sections of the EIS analysis. In these cases, the location in the FEIS where the analysis can be found could be referenced. -We recommend identifying whether the measure is voluntary or could be required by a Federal, state, or local permit/approval (and identify which permit).	
Chapter 5 Mitigation	Table 5-2	pg. 5-10	We appreciate the inclusion of a draft Fugitive Dust Control Plan in RFI 134.	Consistent with CEQ guidance on NEPA and mitigation, to improve the effectiveness of the dust control plan, we recommend that the dust control plan state that an operations and maintenance plan will be developed and implemented prior to construction. The O&M plan should include key aspects such as: 1) More stringent commitments regarding implementation; 2) Set cut points for plan activation (e.g., after x days without rain/snow, or upon detection of dust plumes); 3) An indication of when the filter baghouse would be operated (e.g., year round); 4) A list of staff positions responsible for each measure, and a way to contact them. (this would appropriately include a list of staff positions that can trigger a dust control measure); and 5) A specific list of training (e.g., who gets trained, and to what level).	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Chapter 5 Mitigation	Table 5-2	pg. 5-12	We appreciate that the elements of an Aquatic Resources Monitoring Plan are described in the "Monitoring and Adaptive Management Plan" (RFI-135). The Monitoring and Adaptive Management Plan does not include proposed adaptive management approaches that could be taken to address the results of the monitoring. The Monitoring Summary primarily describes (at a conceptual level) the monitoring that would be conducted by PLP to document compliance with permit conditions. Conceptually, any monitoring program should provide a mechanism to assess the accuracy of predicted project impacts and the effectiveness of mitigation measures. We note that the monitoring plans summarized in the PFEIS and Monitoring and Adaptive Management Plan do not focus on assessing project impacts and do not identify adaptive measures to reduce project impacts. Based on our review, the Monitoring Summary suggests that PLP will be able to document compliance with certain permit authorizations but does not suggest that project impacts would be quickly identified and reduced through adaptive management. The Water Management Plan (Section 3.1) involves continuous monitoring of discharge from the WTPs. This will allow PLP to document compliance with the authorized discharge volumes, but does not assess impacts from those discharges. The Water Quality Monitoring Plan (Section 3.4) identifies that discharge flow and water quality parameters would be monitored at numerous surface water sites, monthly or quarterly, and could be used to document compliance with discharge criteria. The Aquatic Resources Monitoring Plan (Section 3.5) proposes the monitoring of periphyton, aquatic macroinvertebrates, fish catch per unit effort, metals in sediment, and the acreage of pools, riffles, and runs in streams. Monitoring these receptors would allow impact levels to be quantified, thus addressing some of the uncertainty in predicting project impacts. However, monitoring is proposed on an annual basis (every five years for stream habitats) which would limit the ability to identify and adapt to greater-than-predicted project impacts. The Aquatic Resources Monitoring Plan states that the monitoring would be used to “determine adverse changes to aquatic habitat compared to baseline measurements” but doesn’t identify what nature or degree of change relative to the baseline would be considered “adverse.” The PFEIS does not predict impacts to any of the monitored receptors, so discerning whether changes are project-related may be a challenge. Identifying a specific mechanism of impact would also likely be difficult. For example, changes in aquatic	We recommend that the Monitoring and Adaptive Management Plan (particularly Sections 3.1 and 3.4) identify how the monitoring could be used to assess impacts from the authorized discharges or from an exceedance of a discharge criteria. We also recommend providing additional detail in Table 5-2 of the FEIS that defines how project impacts would be quickly identified and reduced through adaptive management and which regulatory agency/permit would require this.	
Chapter 5 Mitigation	Section 5.4, Table 5-4	5-45	We appreciate inclusion of the new Table 5-4 that identifies some of the major management and monitoring plans that would be developed for the project. As noted in the PFEIS text, some of these plans have been drafted and would be refined during permitting. Section 5.2.1.1 (pg 5-3) identifies two additional plans (Plan of Operations and Waste Management Plan) that we recommend be included in Table 5-4, to disclose the status of these plans to decision makers and the public and so that there is consistency with Section 5.2.1.1.	We recommend including the Waste Management Plan and Plan of Operations in Table 5-4 since these are important plans typically developed for mining projects and these plans are relied on and referenced elsewhere in the EIS.	
Appendix M - Mitigation Assessment	Table M-1	M-9	Table M-1 includes a proposed measure for monitoring of subsistence foods.	We agree with development of a Subsistence Foods Monitoring Plan that is discussed in the FEIS, in order to monitor the potential impacts from the project to communities that rely on subsistence resources.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix M - Mitigation Assessment	Table M-1	M-34	EPA's DEIS comment regarding mitigation measures that were recommended from AECOM's independent review of water treatment (such as for salt and selenium build up) is included word-for-word in PFEIS Table M-1. We appreciate that the PFEIS provides additional information related to water treatment, discloses concerns about the technical viability of the treatment processes, and recommends further evaluation (Section K4.18.2.5, bullets on pages 4.18-54 to K4.18-55 and first full paragraph on page K4.18-55).	We recommend that the wording in Table M-1 be revised to include the updated recommendations for further evaluation of the water treatment processes found in Section K4.18.2.5 (bullets on pages 4.18-54 to K4.18-55 and first full paragraph on page K4.18-55). Further, we recommend that the Corps consider noting in the FEIS that the NPDES regulations at 40 CFR 122.4(i) prohibits issuance of an NPDES permit to a new source if the discharge from its construction or operation will cause or contribute to the violation of water quality standards. We believe further evaluation of water treatment is important to ensure that the treatment will be technically viable and effective at meeting water quality standards.	
January 2020 draft Compensatory Mitigation Plan (referred to in PFEIS section 5.3.1)	General comment		The comments below are intended to ensure adequacy of the draft Compensatory Mitigation Plan for NEPA purposes and to help improve and inform the 404 analysis that is integrated into the EIS. These comments do not constitute all of EPA's Section 404-related comments, including on the draft Compensatory Mitigation Plan, which are the topic of ongoing discussions between EPA and the Corps.		
January 2020 draft Compensatory Mitigation Plan (referred to in PFEIS section 5.3.1)	4	6	It appears that no compensation is being provided for the permanent loss of more than 2,000 acres of wetlands in the Nushagak River watershed and that no compensation is being provided for more than 90 miles of permanent stream loss in the Nushagak River watershed. Based on available scientific information about the wetland and stream resources in the Nushagak River watershed and their importance to fish (e.g., Brennan et al. 2019) these kinds of losses would appear to necessitate consideration for 404 compensatory mitigation consistent with applicable requirements, including 33 CFR 332.3(f).	We recommend that the FEIS clarify whether compensation will be provided for these unavoidable wetland and stream losses; and describe the plans to compensate for these losses. If compensation is not being provided, we recommend that the FEIS explain why it is not being provided.	
January 2020 draft Compensatory Mitigation Plan	4	6	It appears that no compensation is being provided for the more than 2000 acres of indirect impacts to wetlands and other waters estimated in the PFEIS. These impacts include 1,393 acres of wetlands and waters from fugitive dust, 369 acres of wetlands and waters from dewatering, and 257 acres of wetlands and waters from fragmentation. (Note: EPA has raised concerns in its comments on Chapter 4.22 that indirect impacts have been underestimated.) Based on available scientific information about the wetland and stream resources in the Bristol Bay watershed and their importance to fish (e.g., Brennan et al. 2019) these kinds of impacts would appear to necessitate consideration for compensatory mitigation under 404 consistent with applicable requirements.	We recommend that the FEIS clarify whether compensation will be provided for these unavoidable wetland and stream losses; and describe the plans to compensate for these losses. If compensation is not being provided, we recommend that the FEIS explain why it is not being provided.	
January 2020 draft Compensatory Mitigation Plan	6	26	The current draft includes assertions that impacted stream reaches represent low-quality and/or low-use habitat and does not address available scientific information about the wetland and stream resources in the Nushagak River watershed and their importance to fish (e.g., Brennan et al. 2019) that refute such assertions. See our comments on Chapter 4.24 regarding this issue.	We recommend that references to low-quality and/or low-use habitat be revised to reflect available scientific information (e.g., Brennan et al. 2019) about these stream and wetland resources indicating their important contribution to salmon habitat.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
January 2020 draft Compensatory Mitigation Plan	7	30	This section states that "preservation opportunities are limited due to the land status and unjustifiable due to the lack of foreseeable development threat to existing wetlands and aquatic resources in the Analysis Area."	We recommend that the CMP be revised to address the extent to which expansion of the Pebble Mine represents a significant and foreseeable development that threatens existing aquatic resources in the Analysis Area, as evidenced by the cumulative impacts analysis in Chapter 4.22, which indicates that expansion of the mine site would impact an additional 8,484 acres of wetlands and 228 miles of rivers and streams. (33 CFR 332.3(b)(1), (h))	
January 2020 draft Compensatory Mitigation Plan	7.1 and Attachment 3	30	The first of the three components of the proposed CMP appears to be performing improvements to wastewater collection and treatment systems in three villages in the Kvichak River watershed. We recommend that the FEIS explain how such wastewater facility improvement projects would be appropriate compensation measures (under CWA section 404).	We recommend that the FEIS and CMP be revised to explain if and how improvements to wastewater collection and treatments systems comply with the Guidelines. Further, we recommend explaining how improvements to these facilities in the Kvichak River watershed would adequately compensate for the 97% of Pebble Project impacts to wetlands, streams, and other aquatic resources that occur in the Nushagak River watershed. In addition, we recommend that the EIS and CMP explain the type and amount of impacts this component of the CMP would offset and why it would be an effective compensation measure for offsetting that type and amount of impact.	
January 2020 draft Compensatory Mitigation Plan	7.1 and Attachment 4	30	Although the PFEIS estimates that the proposed project would result in the loss of 105.4 miles of stream and would degrade more than 80 additional miles of stream (EPA has commented that the miles of stream degradation may be underestimated in our comments on PFEIS Chapter 4.22), the CMP proposes to offset impacts to only 8.5 miles of stream that have been documented as anadromous waters. To offset these 8.5 miles of impacts, the CMP proposes to rehabilitate 8.5 miles of salmon habitat by removing or replacing culverts that limit the passage of juvenile and/or adult salmon (this represents the second component of Pebble's draft CMP). The PFEIS does not explain how 8.5 miles of stream rehabilitation will offset impacts to more than 180 miles of streams consistent with Section 404 compensatory mitigation requirements (33 C.F.R. 332.3(f)).	We recommend that the CMP and EIS be revised to explain how 8.5 miles of stream rehabilitation will adequately offset impacts to more than 180 miles of streams.	
January 2020 draft Compensatory Mitigation Plan	Attachment 4, section 2	5	According to the CMP, the actual location(s) of the culvert replacement project(s) have not been selected. This precludes development of a compensatory mitigation plan at this time, as well as a meaningful evaluation of the potential for any specific projects to provide potential offsets. It is also not possible to determine if another entity is responsible for addressing issues with the culvert(s) in question. The draft CMP indicates that actual locations of the culvert replacement projects will "occur after receipt of the approved DA Permit Application for the Pebble Project, in coordination with interested partners." It is not clear how the Corps could approve the DA Permit without first having reviewed and approved a complete mitigation plan for the culvert replacement projects (33 CFR 332.4(c)(1)(i)) and such a plan cannot be finalized without first identifying and evaluating specific locations for the culvert replacements.	In order to be able to develop a draft mitigation plan for review, we recommend that specific locations for culvert replacement projects be identified. Once specific culvert replacement project locations have been identified, the CMP will be reviewed and updated as appropriate to include a complete mitigation plan describing the proposed culvert replacement projects and including all of the elements of a complete draft mitigation plan (e.g., baseline data, work plan, etc). As part of developing such a plan, determinations should be made regarding whether another entity is responsible for addressing issues with the culvert(s) in question. We recommend that USACE note that based on the specific locations of the culvert replacements, the NEPA analysis will be reviewed and updated as appropriate and consistent with USACE implementing regulations.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
January 2020 draft Compensatory Mitigation Plan	Attachment 5		The third component of the proposed CMP appears to be a one-time beach clean up of approximately 7.4 miles of coastal habitat on Kamishak Bay along the Cook Inlet. The draft CMP does not identify which impacted resources this beach clean-up is specifically designed to offset or how much impact it is designed to offset.	We recommend that the PFEIS and Draft CMP be revised to explain if and how a one-time beach clean up of approximately 7.4 miles of coastal habitat would be appropriate compensation for unavoidable impacts to aquatic resources. And if it is, we recommend that the EIS and CMP explain the type and amount of impacts the one-time beach clean up will offset and why it would be an effective compensation measure for offsetting that type and amount of impact.	
January 2020 draft Compensatory Mitigation Plan	General Comment		We are concerned that the DEIS did not include a draft CMP with specific projects for the public to review.	Consistent with our July 1, 2019 comments on the Section 404 public notice, once a complete draft CMP has been developed, including the evaluation and disclosure of specific mitigation projects, we recommend that the Corps provide an opportunity for public comment on the complete draft CMP.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Executive Summary	3.2.1.1	ES40	Regarding the statement that, "Only the UTC treated water discharge location and a short portion of the mine access road would be in the UTC watershed (see Figure ES-2)."	EPA recommends correcting the discrepancy between this statement and the information on ES1 stating that the applicant's alternative will not have a road in UTC.	
Executive Summary	3.2.1.1	ES42	Regarding the statement that, "Western portions of the mine access road are in the well-studied UTC drainage."	EPA recommends clarifying that this would be the case for some alternatives, but not the applicant's alternative, if the statement on ES1 about no road in the UTC watershed is accurate.	
Executive Summary	3.2.2.3	ES58	The Executive summary states, "Ground disturbance during construction has the potential to lead to erosion and introduce suspended sediment and increased turbidity into waterbodies downstream of the mine site, potentially resulting in direct and indirect impacts to water quality. These effects are likely to occur, and the magnitude and extent of direct impacts would include increased turbidity, temperature changes, or changes in water chemistry in downstream waterbodies."	Even though this statement recognizes that sediments will be introduced to waterbodies, EPA recommends that the direct impacts include not only increased turbidity, but also increased sediment deposition downstream of the discharge point which could affect spawning areas by filling in interstitial spaces.	
Executive Summary	3.2.2.3	ES60	The Executive Summary states, "The likelihood of small spills and contaminated runoff would increase because of the extra container and fuel storage under this variant, although this would be expected to be mitigated by water treatment of runoff."	This statement is applicable to Alternative 2, which recognizes that other alternatives have the potential to generate this type of discharge. We note that no other alternative evaluated in the EIS discusses the mitigation of small spills and contaminated runoff. EPA recommends that this discussion of mitigation for small spills and contaminated runoff be included for each alternative.	
3.18 Water and Sediment Quality	All data discussions except surface water quality		We appreciate revisions which now include discussion of data quality and quality control for the surface water quality data. However, there remains a need for inclusion of a discussion of data quality for other samples used in the analysis (tailings, waste rock, sediment samples, and groundwater samples). It is especially important that source terms and subsequent modeling doesn't include data having poor quality since each of those steps propagates through subsequent steps and interpretations of data.	We recommend briefly describing the QA/QC conducted for use of the other types of data, similar to the discussion included for the surface water data.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.18 Water and Sediment Quality	3.18.1.1	3.18-3	Regarding: "To date, limited geochemical testing has been performed on the representative concentrate because possible designs for metallurgical processes are still at an investigative stage." In our comment on the Draft EIS regarding Tailings Representativeness, we provided recommendations to address our concern that, because the characteristics of the tailings may be different from the ones used in the geochemical testing, the predictions may not be representative of the actual water quality. We also recommended that a sensitivity and uncertainty analysis be conducted, to increase confidence in the accuracy of the water quality predictions. We appreciate the new information in SRK 2019a that addresses this comment.	We recommend that the text in the Final EIS be updated to reflect the new information in SRK 2019a or to provide a reference to that document.	
3.18 Water and Sediment Quality	3.18.1.1	3.18-3	Regarding: "PAG waste rock is defined as any rock with a neutralization potential (NP)/acid-generating potential (AP) ratio equal to or greater than the site-determined NP/AP criterion of 1.4 (PLP 2018a)". The site-specific value of 1.4 is an important number because it would be used to segregate PAG from non-PAG materials. We appreciate the additional information provided in SRK 2019 to support the calculation of the 1.4 value. We note that there are several factors that can affect the calculation of neutralizing potential to acid producing ratios (NP/AP) and result in predictions that differ from conditions encountered during operations.	We continue to recommend, given uncertainties in the NP/AP calculations, that a more conservative ratio (such as 2 or 3) be used to differentiate PAG from non-PAG. Our DEIS comments provide additional detail to support this recommendation, including the use of a ratio of 2 in some of the EIS supporting documents.	
3.18 Water and Sediment Quality	3.18.1.1 Sampling and testing program	3.18-3	"*...pyritic, and gold plant tailings from test processing of ore composites have been characterized*."	We recommend clarifying what constitutes "gold plant tailings" in the FEIS, since a gold plant is not part of the proposed ore processing flowsheet.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.18 Water and Sediment Quality	3.18.1.1	3.18-4	Regarding the element release rates discussed in the PFEIS, we continue to be concerned that the temperature corrections applied to the HCT release rates will underestimate leaching rates encountered at the mine site. As indicated in the SRK 2019a document, a very significant correction factor is applied to the measured rates. The correction factor used is a 0.2 multiplier to the measured rates; which results in an 80% reduction. This correction factor is based on applying an annual average temperature of 8 degrees Celsius. Using an annual average temperature does not provide a conservative estimate of metal releases for several reasons. The annual average incorporates many months of sub-zero temperatures into this average. A more conservative annual average would be based only on time periods when the temperature was >0; a slightly less conservative approach would be based on an average that substituted 0's for time periods when the temperature was negative. In addition, temperatures below the surface are often higher than air temperatures, especially if they are insulated with snow cover.	Overall, we are concerned about the large temperature corrections applied to the chemical release rates and recommend that a more conservative approach would be to model the impacts on water quality without this correction factor applied. However, if a correction factor is applied, we recommend that it not be based on an annual average air temperature for the reasons stated above. We recommend instead that it be more representative of conditions encountered during the spring/summer/fall at the site.	
3.18 Water and Sediment Quality	3.18.1.1 Weathering and Leaching Rates	3.18-4	Regarding: "Paste pH results for aged rock cores stored at the site suggest that acidification may be delayed up to 40 years for 95 percent of the pre-Tertiary mineralized rock (SRK 2011a). Given differences in the test conditions, laboratory and field tests suggest that oxidized pre-Tertiary mineralized rock may take up to several decades for acidification to occur." Paste pH results appear to be used to support the second sentence regarding "several decades for acidification to occur." As noted in comments on the DEIS, paste pH is not a kinetic test and rock cores are not the same as tailings that have undergone extensive processing which enhances reactivity. Additionally, data in Table K3.18-3 indicate that paste pH is a poor predictor for the NP/AP, which is used to determine PAG versus NPAG, with near neutral and slightly basic pH values corresponding to NP/AP values both well above and well below 1.4.	We recommend revising text to state, "years to decades" to reflect other statements in the paragraph (years to acidification corresponding to NP/AP that appear to have had kinetic testing) or providing different support for the statement in the FEIS.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.18 Water and Sediment Quality	3.18.1.1	3.18-5	*"However, some rocks do have the potential to leach certain constituents under circumneutral pH, mainly arsenic and sulfate."* We note that on Page 3.18-4, the document states: *"However, the release of some elements, arsenic, molybdenum, and selenium, can be environmentally significant under circumneutral pH as described in SRK (2011a).* " While sulfate can be released under any pH, it's primarily released under lower than circumneutral pH.	We recommend clarifying in the FEIS whether this should read "…mainly arsenic and selenium."	
3.18 Water and Sediment Quality	3.18.1.2	3.18-8	Regarding the statement that, "Mean TSS values did not exceed the most stringent water quality criteria for any rivers in the mine site area; however, at least one exceedance was recorded in a sample collected at the UTC."	EPA recommends clarifying that there is no Alaska water quality criterion for TSS and that the comparison value is from the technology-based effluent limitations guideline (ELG) in 40 CFR 440 Subpart J - New Source Performance Standards	
3.18 Water and Sediment Quality	3.18.2.1	3.18-16	Regarding: "Surface water quality data described above for the UTC drainage at the mine site are pertinent to the mine access road segments for all alternatives in the UTC drainage."	EPA recommends reconciling this statement in the FEIS with the one made in the Summary of Changes, on page ES-1, saying that the Applicant's Alternative keeps the mine access road out of the UTC watershed.	
3.18 Water and Sediment Quality	3.18.3.1	3.18-22	Regarding: "The discussion of marine water quality below presents regional information, as well as data collected in northern Kamishak Bay (2004 to 2012) and offshore of the Amakdedori port site (2018) that are pertinent to Alternative 1."	EPA recommends clarifying whether this information would also be pertinent to the Applicant's Preferred Alternative.	
3.18 Water and Sediment Quality	3.18.3.1	3.18-22	Regarding: "... measured no exceedances of the marine screening criteria or the most stringent water quality criteria for TSS…"	EPA recommends clarifying that there is no Alaska water quality criterion for TSS and that the comparison value is from the ELG in 40 CFR 440 Subpart J - New Source Performance Standards.	
Appendix K3.18 Water and Sediment Quality	K3.18.1.1	K3.18-1	Regarding: "For certain mine treatment facilities, effluent discharge volume could be limited to the difference between precipitation (including runoff) and evaporation."	In order to be consistent with applicable New Source Performance Standards, EPA recommends that this text be changed to say that for certain mine treatment facilities, "the effluent discharge **is** limited to net precipitation."	
Appendix K3.18 Water and Sediment Quality	Table K3.18-1	K3.18-3	Nickel (H) (total) Nickel (dissolved)	EPA recommends clarifying why there is a total and a dissolved criterion listed for nickel and no other metal. If the dissolved criterion for nickel is included in the FEIS, we note that it is hardness based, similar to the criterion for total nickel.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix K3.18 Water and Sediment Quality	Table K3.18-1	K3.18-4	Ammonia (NH_3) as Nitrogen (N) Total Ammonia as N[g]	EPA recommends footnoting the first occurrence of ammonia in the Table with footnote g because the value of 4.36 appears in the ammonia Tables in the ADEC Toxics Manual as a freshwater chronic criterion. We note that the value of 0.18 appears to be a marine water criterion, applicable at either salinities of 10 g/kg, 20°C, pH of 8.8, or 20 g/kg, 15°C, pH of 9, none of which are applicable to the discharges to the freshwater in the vicinity of the mine site.	
Appendix K3.18 Water and Sediment Quality	Table K3.18-1	K3.18-4	Regarding Footnote a: "Water quality limits are based on the lowest 15th percentile hardness of the three proposed discharge locations" and Footnote j: "Hardness-dependent criteria (cadmium, copper, chromium III, lead, nickel, silver, zinc) are calculated using the estimated 15th percentile conditions for the receiving streams. The most stringent of the three proposed discharge locations is included in the table."	EPA recommends that the footnote provide the numerical hardness value used for criteria development, because back calculating the hardness from the listed criteria provides a range of hardness values: Cd - 18.7, Cr III - 16, Cu - 18.3, Pb - 19.4, Ni (total) - 19.1, Ni (diss) - 11.3, Ag - 47, Zn - 18.7	
Appendix K3.18 Water and Sediment Quality	Table K3.18-1	K3.18-4	Regarding Footnote i: "There is no criterion for hardness in the State of Alaska WQS. Hardness value indicates the most stringent condition of the three proposed discharge locations."	EPA recommends clarifying the exact value for hardness in the FEIS, currently listed as "~= 100." As stated, it is the most stringent condition, but it is well above the value utilized in developing the hardness based criteria in the Table (ranging from 11.3 - 47, see comment above). If this is an anticipated effluent value, then we recommend it be footnoted as such.	
Appendix K3.18 Water and Sediment Quality	Table K3.18-2	K3.18-8	Regarding: "Notes: One of these tests comprised material from both the Pebble East and Pebble West zones."	EPA recommends that this note be provided as a footnote, rather than a general note, in order to clarify which part of the Table the note applies to.	
Appendix K3.18 Water and Sediment (	K3.18.2.1	K3.18-9	Regarding: "Paste pH results for aged rock cores stored at the site suggest that acidification may be delayed up to 40 years. Given differences in the test conditions, laboratory and field tests suggest that oxidized pre-Tertiary mineralized rock may take up to several decades for acidification to occur."	We appreciate that our earlier recommendation to provide additional information regarding the grain size of the aged rock cores and how this would impact the acid rock drainage (ARD) timeframe has been addressed in SRK 2019. We recommend that FEIS text be updated to reflect this new information.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix K3.18 Water and Sediment (	Table K3.18-3	K3.18-10	Table K3.18-3.	We appreciate that additional information regarding the representativeness of the geochemical dataset has been provided in SRK 2019f. We continue to recommend that this information be included in the body of the FEIS document in Table 3.18-3. For more details on this recommendation, see our comment letter on the DEIS.	
Appendix K3.18 Water and Sediment Quality	Table K3.18-7 Table K3.18-8 Table K3.18-9 Table K3.18-10	K3.18-26 K3.18-29 K3.18-32 K3.18-35	The tables highlight turbidity exceedences for values above 5 NTU	EPA recommends clarifying that the WQS for turbidity is relative to the natural condition of the receiving water. We recommend not indicating in the table that an exceedence has occurred without this additional information being known, or alternatively that an assumption of zero as the natural condition be stated.	
Appendix K3.18 Water and Sediment Quality	Table K3.18-9 Table K3.18-11 Table K3.18-12 Table K3.18-13	K3.18-32 K3.18-41 K3.18-45 K3.18-45	Regarding Footnote a: "Bold values indicate fields that exceed the most stringent water quality criteria"	EPA recommends clarifying that an exceedence for TSS in this table is based on the technology-based effluent limitations guideline (ELG) in 40 CFR 440 Subpart J - New Source Performance Standards, because there is no Alaska water quality criterion for TSS.	
Appendix K3.18 Water and Sediment Quality	Table K3.18-13 Table K3.18-28, and Table K3.18-20	K3.18-46 to 48, K3.18-59 to 63 and K3.18-66 to 67	The new information in the tables is appreciated and helpful to understand if an analyte is actually present. For example, the PFEIS shows values provided under "range of detects" in Tables 7 through 12 for analytes where the percent detected was 0%. Tables K3.18-13, K3.18-18, and K3.18-20 would benefit from some similar additional information.	We continue to recommend either providing the detection limits or the frequency of detection in all of these tables. If detected in all samples for a given table, we suggest simply using a footnote to indicate that.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix K3.18 Water and Sediment Quality	Table K3.18-18	K3.18-63	Minimum dissolved oxygen concentrations under "range of detects" for both the "outside deposit area" and the "deposit area" appear to be erroneous since they are negative values. The maximum given for outside the deposit area is 73.6 mg/l, which is erroneously high. It is slightly higher than saturation values can exist, as pointed out in a footnote on Table 18.8, but this is much higher than would be expected from photosynthetic oxygen creation and is in groundwater, not surface water. The lowest measurable DO is zero and negative values and other extraneous values indicate a error with field equipment (bubbles under the membrane are a common issue). It appears that the 73.6 value may actually have been a percent saturation reading that was mistakenly reported as a concentration. It is stated earlier in the section that data were rejected if they failed QA/QC, which included assessment of outliers, but we note that 73.6 mg/l appears to be an outlier.	We recommend verifying the data and their usability before releasing the FEIS. This becomes important if the negative value(s) and/or the very high value was used to calculate a mean. We recommend also verifying calculations that were based on the values listed in this table.	
4.18 Water and Sediment Quality	4.18.4.1	4.18-10	Regarding "...under the Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity, Permit Number AKR06000, and would only require treatment for sediments prior to discharge into the environment." Section 3.2.1 of the MSGP says that discharges need to meet WQS for any pollutant of concern, not just for sediments. We note that ADEC could also impose monitoring requirements for other parameters to determine if there is a water quality concern.	We recommend that the FEIS clarify these provisions of the MSGP.	
4.18 Water and Sediment Quality and K4.18 Appendix	4.18.4.1 and K4.18.2.5	4.18-11 and K4.18-54	We appreciate the additional follow-up information provided related to water treatment (RFI-021 series) and the independent review of the water treatment designs and processes. We appreciate that the PFEIS discloses concerns with the proposed treatment processes, which we share. We agree that technical viability of the WTPs requires further evaluation. The water managment ponds are able to store up to three years of water if needed to make modifications to the water treatment plants if needed. The PFEIS states "The mitigations are reasonable technical strategies, but the ability to implement such significant changes to the treatment processes within a 3-year period requires further evaluation to determine if engineering and construction can be completed."	We recommend that evaluation of whether the 3-year water storage capacity is sufficient be completed and included in the FEIS, since this is relevant to the effectiveness and implementability of making changes to the water management system and important for NEPA disclosure of potential impacts for decision-makers and the public. Since the proposed water treatment systems have not been commercially demonstrated at the scale of the Pebble Project, water treatment system changes could occur, therefore storage capacity is an important consideration for this project to ensure ability to manage and treat water to achieve water quality standards.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.18 Water and Sediment Quality	4.18.4.1	4.18-12	Regarding information indicating that ADEC regulates wastewater discharges from hard-rock mining facilities through various permits, including Domestic Wastewater Discharge Permits.	EPA recommends clarifying in the FEIS that the discharge of domestic wastewater to Waters of the US requires an APDES permit ("domestic wastewater" according to 18 AAC 72 means waterborne human wastes or graywater derived from dwellings, commercial buildings, institutions, or similar structures), and discharge to other than WOTUS would require a State Wastewater Disposal permit.	
4.18 Water and Sediment Quality	4.18.4.1	4.18-12	Regarding: "An APDES permit is necessary and would be issued unless discharge is not to wetlands and other waters, in which case a domestic wastewater discharge permit would be required."	EPA recommends verifying this sentence with ADEC. It is our understanding that discharges to other waters not considered WOTUS would require a State Wastewater Disposal Permit, regardless of whether the discharge is domestic wastewater or not	
4.18 Water and Sediment Quality	4.18.4.1	4.18-14	Regarding: "WTP #3 would use the same steps as WTP #2, with the addition of a brine evaporation and crystallization system to remove salts."	We recommend that the FEIS clarify where the salts that are removed would be disposed, as the disposal location selected could have an impact on future water treatment needs or on the environment surrounding any other future disposal site.	
4.18 Water & Sediment Quality	4.18.4.1 Mine Site - Effects of Waste Rock/Tailings Storage and Water Management Ponds	4.18-16	Regarding: "Pyritic tailings would be submerged at a sufficient depth to prevent resuspension of tailings by wind-induced waves or oxidation of the tailings through exposure to air."	We recommend that the FEIS provide details regarding the determination on what depth is "sufficient." It is not clear from the discussion (or Appendix N) how the depth (or what depth) of water cover **over both** the PAG waste rock and the pyritic tailings is going to be attained and then maintained during operations to minimize potential for oxidation by dissolved oxygen.We additionally recommend changing text from "prevent" to "minimize."	
4.18 Water & Sediment Quality	4.18.4.1 Mine Site - Effects of Discharge Water Temperature	4.18-17	Regarding: "Temperature changes in the SFK watershed approximately 1.4 miles downstream of the WTP discharge point at the outfall of Frying Pan Lake would be expected to be in the range of about -0.20 to +0.40°C (average of about -0.038°C) in summer months."	We recommend including the change for winter months.	
4.18 Water and Sediment Quality	4.18.4.1	4.18-17	Regarding: "Influent water would be heated to approximately 6°C for treatment, and under the coldest expected conditions, effluent would be cooled to about 4.5°C prior to discharge into the environment."	EPA recommends clarification on the potential for cooling the discharge during the warmer parts of the year to meet temperature criterion.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.18 Water & Sediment Quality	4.18.4.1 Mine Site - Effect of Treated Water Discharge on Environmental Mass Load	4.18-18	Regarding: "The potential for the methylation of mercury as a result of the anticipated mass of sulfate to be released from WTPs was examined."	We recommend providing the reference in the FEIS for where this mercury methylation examination can be found.	
4.18 Water and Sediment Quality	4.18.4.1	4.18-20	Regarding: "The discharge limits described in this section and Appendices K3.18 and K4.18 would become part of an APDES permit."	We recommend that the FEIS clarify that this document does not contain discharge limits. Rather, it contains the WQ criteria upon which the effluent limitations of an APDES permit would be based.	
4.18 Water & Sediment Quality	4.18.4.1 Mine Site - Effects from Pit Lake in Closure	4.18-24	Regarding: "Should the monitoring find that groundwater does not flow toward the pit, or that groundwater quality outside the pit is degraded during the post-closure period, the MM level (890 feet amsl) would be reconsidered, and the pit lake level would be lowered to maintain hydraulic containment." It is not clear how lowering the water level in the pit would affect oxygen concentrations in the water and diffusion of oxygen into lower pit areas that could alter conditions to result in acid generation or chemical or thermal gradients that may keep wastes isolated.	We recommend noting the need for a balance between hydraulic containment and water cover depth over the waste materials (or referring a reader to sections that capture this). Section 4.17 (as mentioned in the SOCs) does capture discussion of depth w/respect to hydraulic containment but not with respect to the water cover over materials.	
4.18 Water & Sediment Quality	4.18.4.3 Amakdedori Port Surface Water Quality	4.18-30	Regarding: "Water treatment would also address any hydrocarbons (petroleum, oil, lubricants) in the runoff (PLP 2018-RFI 087)." We note that there is no discussion in Chapters 2 or K4.18 about treatment of hydrocarbons or in any of the RFIs, with the exception of RFI-087 saying "water treatment would address POL."	We recommend adding discussion of treatment of hydrocarbons to the discussion of water treatment to provide support for the referenced sentence.	
4.18 Water and Sediment Quality	4.18.4.3	4.18-31	Regarding: "Fuel, oil, and lubricants may leak from vessels into Kamishak Bay and Cook Inlet waters."	EPA recommends that the additional types of vessel discharges covered by the Vessel General Permit or Coast Guard regulations also be disclosed in the FEIS.	
4.18 Water and Sediment Quality	4.18.4.4	4.18-32	Regarding: "The removal of water from rivers and small lakes along the route for hydrostatic pipeline pressure testing would be required. However, the water volume removed for testing purposes would be small; therefore, impacts on surface water quality from hydrostatic testing are not expected."	It is not clear from this statement how a conclusion that impacts to water quality would be limited can be drawn, based on the quantity of the water removed. We recommend that the FEIS provide additional information to support this conclusion, or revise the statement if not supported by the analysis.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.18 Water & Sediment Quality	4.18.6.2 Transportation Corridor - Summer only Ferry Options Variant	4.18-36	Regarding: "The likelihood of small spills and contaminated runoff would increase because of the extra container and fuel storage under this variant, although this is expected to be mitigated by water treatment of runoff (major spills from extra container and fuel storage are addressed in Section 4.27, Spill Risk)." We note that there is no discussion in 4.27 Spill Risk regarding extra containers.	We recommend adding the discussion of the impacts of extra container and fuel storage to Chapter 4.27	
4.18 Water and Sediment Quality	4.18.6.3	4.18-37	Regarding: "The saline water placed in the bermed containment would be expected to seep into underlying soils, and would mix with any shallow groundwater present."	We recommend that the FEIS clarify whether there will be a surface discharge from the containment of dredge materials (i.e., not just groundwater infiltration).	
4.18 Water and Sediment Quality	4.18.7.3	4.18-39	Regarding: "The water removed from the concentrate would be treated in a WTP to meet marine water quality standards, and discharged through an outfall pipeline and diffuser to the marine environment."	Because federal regulations and state regulations adopted by reference do not allow this type of discharge, EPA continues to recommend that this discharge option be removed from the FEIS. We acknowledge that this will be addressed during the State permitting process and note the State of Alaska has agreed with EPA's comments on this point (RFI-158).	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Appendix K4.18 Water and Sediment Quality	K4.18.1	K4.18.1-1	Water Quality Modeling and "first flush" data. We continue to be concerned that the source term concentrations used in the water quality model predictions underestimate the magnitude of the water quality impacts. For example, the SRK 2018 document: "Geochemical Source Terms for Water Treatment Planning" states that: "The average rate following the end of the flush is calculated for each test." By excluding the first flush of elevated metal/metalloid concentrations in the source term calculations, the concentrations during mine operations will be underestimated. While the first flush effect may be temporally isolated for a given sample of rock, at an active mine site, fresh rock/ore is being generated daily. As such, what is considered a temporally isolated event in the HCTs will be ongoing throughout the mining operations as new material is exposed to water. While the percentage of material experiencing the first flush effect at the mine site decreases over the course of the mine life, the complete removal of these initial elevated concentrations from the modeling exercises results in an underestimation of the actual water quality impacts.	We continue to recommend that the modeling include the first flush effect in its calculations. The response to our comment on the DEIS is provided in SRK 2019a: "In laboratory tests, the 'first flush' effect is often attributable to leaching of oxidation products that had accumulated before the sample was tested while the sample was in storage as core or crushed prior to analysis. This flush may be an artifact of the pre-test conditions and therefore should not be applied directly to predicting performance under field conditions." Based on the factors we have described in Column D, rather than being "an artifact of pre-test conditions," the first flush may be representative of some in-situ conditions encountered during the mining operations where materials may be oxidized during temporary storage and may result in the accumulation of oxidized products during this time. We recommend that, as the goal of the modeling is to simulate a conservative assessment of water quality during mine operations, the modeling should not discard the "first flush" data that was measured as part of the geochemical analysis.	
Appendix K4.18 Water and Sediment Quality	K4.18.1.1	K4.18-2	Regarding "The combined annual average WTP discharges from the three WTPs." We note that other sections of the FEIS (section 2.2.4.2) describe two WTPs during operations.	We recommend that the FEIS clarify the number of Water Treatment Plants in use during operations. If the treatment volumes presented here are dependent on 3 WTPs operating, corrections should be made if there will be only 2 WTPs.	
Appendix K4.18 Water and Sediment Quality	K4.18.1.1	K4.18-4	Regarding: "Although Figure K4.18-1 through Figure K4.18-5 represent predictions from the water quality model prior to the update of Knight Piésold (2019s)..."	We recommend that the FEIS include new figures based on the most recent, more accurate, modeling predictions.	
K4.18 Water & Sediment Quality Appendix	K4.18-1.1 - Geochemical Source Terms and Water Quality Model	K4.18-4	Regarding: "Where datasets are used to evaluate solubility of ions in solution, upper values provide the best representation of the expected value because lower values are probably affected by dilution. In this case, the 99th percentile was used mainly to screen **anomalously high values that may be a result of data quality issues**."	We recommend that the FEIS describe the QA process for assessing the data and explain why any data would have quality issues. We are concerned that any errors could be reflected in other calculations throughout the project and therefore, incorrectly disclose information in the FEIS.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
K4.18 Water & Sediment Quality Appendix	K4.18.1 Water Quality Modeling - Predicted Water Quality	K4.18-17	Regarding: "The mass balance model used to predict water quality cannot explicitly model pH. Instead, a range of values was assumed based on source terms provided by SRK (2019a, e) (Table K4.18-2) and relative flow contributions to the facilities. Although mine site surface soils are acidic (SLR et al. 2011a), the assumed pH values (7 to 8) are consistent with those of mine site groundwaters, as groundwaters in both overburden and bedrock are mostly circumneutral (Table K3.18-18)."	We recommend adding additional information to support the use of the groundwater pH as a relevant factor in determining the pH to be used water quality modeling.	
K4.18 Water & Sediment Quality Appendix	K4.18.1 Water Quality Modeling - Predicted Water Quality	K4.18-17	From KP 2019s (RFI 021g): "Loading from waste rock in the Pyritic TSF during Operations and in the Open Pit during Closure Phase 1 is calculated using the “high pyritic tailings” source term. Both “high pyritic tailings” and “low pyritic tailings” source terms were provided in SRK (2019a) and these terms represent the area of exposed waste rock and the waste rock interaction with the pyritic tailings. The “low pyritic tailings” case means less waste rock is affected by the pyritic tailings, while the “high pyritic tailings” case means more waste rock has interacted with the pyritic tailings. Neither of these cases can be directly quantified, so these two source terms provide the potential chemistry that could be produced from the waste rock runoff. The “high pyritic tailings” accounts for more interaction with the pyritic tailings and was therefore selected for the water quality model."	We recommend clarifying how the updated source terms for pH were incorporated into the new data tables. Currently it appears from the text on Page 17, and subsequent tables, that modeling for all sources, including the pyritic TSF and the pit, use pH 7 to 8, although KP 2019s indicates the "high pyritic tailings" were selected for the water quality model. The pHs in SRK 2019e are reflected in Table K4.18-2.	
K4.18 Water & Sediment Quality Appendix	Table K4.18-4 Predicted WQ in Mine Storage Ponds in Operations	K4.18-19	Regarding footnotes: "Model input concentrations provided by SRK (2018a, 2019d)" and "pH was not modeled; pH values are based on the range of pH source terms provided by SRK (2018a, 2019d) (Knight Piésold 2019s)"	We note that reference SRK 2019d should be SRK 2019e for both footnotes. Also, 2019e is not found on the website (by title), but is Appendix D of the Knight Piesold 2019s (RFI 021g) document. We recommend revising for accuracy in the FEIS.	
K4.18 Water & Sediment Quality Appendix	Table K4.18-5 Predicted WQ Inflows for WTPs in Closure	K4.18-21	Regarding Footnote: "pH was not modeled; pH values are based on the range of pH source terms provided by SRK (2018a, 2019d) (Knight Piésold 2019s)"	We note that reference SRK 2019d should be SRK 2019e. Also, 2019e is not found on the website (by title), but is Appendix D of the Knight Piesold 2019s (RFI 021g) document. We recommend revising for accuracy in the FEIS.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
K4.18 Water & Sediment Quality Appendix	Tables 4.18-2; 4.18-3; 4.18-4; 4.18-5; 4.18-7; 4.18-8; 4.18-9; 4.18-10; 4.18-11; 4.18-13; 4.18-14; 4.18-15; and 4.18-16	multiple	The referenced tables do not specify whether the water concentration and load results are total recoverable or dissolved (filtered).	We recommend providing a footnote on tables that would indicate whether the results are total recoverable or dissolved (and filtration size if known).	
K4.18 Water & Sediment Quality Appendix	K4.18.1.2 Closure and Post-Closure - Pit Lake Model	K4.18-40	Regarding: "Backhauling of the PAG waste rock would end approximately 14 years into closure, and the pyritic tailings transfer would end about 15 years into closure." We note that Figure K4.18-6 shows the level of PAG waste rock above the pyritic tailings in the pit.	We recommend clarifying this statement. It appears these years should be reversed since the pyritic tailings are shown as being overlain by PAG waste rock in Figure 6.	
K4.18 Water & Sediment Quality Appendix	K4.18.1.2 Closure and Post-Closure - Water Balance Model	K4.18-40	Regarding: "*Prior to closure year 15, the pit lake water quality is largely influenced by the pyritic tailings slurry water and PAG waste rock placed in the open pit (Knight Piésold 2018d, 2019s). After closure year 15, pit water quality is influenced by other water sources, including surplus water from the bulk TSF supernatant pond and main SCP, which would be pumped to the open pit through closure year 50 (Knight Piésold 2018d), as well as direct precipitation, surface water run-on, and groundwater inflow to the pit, which could leach metals from oxidized sulfide minerals exposed in the pit walls and metals in unmined mineralized rock adjacent to the pit. As a result, water quality in the pit lake would be expected to be initially acidic but become more alkaline with time, and have elevated.. .*" We note that Table 4.18-7 indicates the pH for the open pit is 7 to 8 for Closure Phase 1 and 2. Table 4.18-7 notes indicate that source terms from SRK 2018a were used for pH, but SRK 2019e has updated source terms. Table 4.18-11 also presents the pH of the water being treated in Closure Phase 1 as pH 7 to 8, which is surplus pit water described as treated in WTP#3 while PAG rock and pyritic tailings are being transferred.	We recommend clarifying anticipated pH for the pit in the different phases of closure, as the text and tables appear to contradict each other in the PFEIS. We also recommend that the FEIS clarify whether the models were rerun with the updated source terms.	
K4.18 Water & Sediment Quality Appendix	K4.18.2 Water Treatment	K4.18-50	Regarding: "Additionally, in closure phases 3 and 4, two additional waste streams of water from the SCP and the open pit would be treated separately in WTP #3 (HDR 2019b, 2019g, 2019h)."	We recommend clarifying what is meant by "two additional waste streams" in the FEIS.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
K4.18 Water & Sediment Quality Appendix	K4.18.2 Water Treatment	K4.18-51	Regarding: "Concentrated reject brine from the fourth stage of RO would be blended with pyritic tailings and pumped to the pyritic TSF." "Figure 2-11 provides a schematic of key water treatment processes to be employed in WTP #1 during mining operations."	Figure 2-11 shows only 3 stages of RO. We recommend revising this discrepancy in the FEIS.	
K4.18 Water & Sediment Quality Appendix	K4.18.2 Water Treatment	K4.18-52	Regarding: "*with the exception that the first stage of RO would be replaced by a nanofiltration step (HDR 2019h; PLP 2019-RFI 021e addendum)*" and "*Figure 2-13 provides a schematic of key water treatment processes to be employed in WTP #2 during closure phase 1.* "	We recommend updating Figure 2-13 to show the nanofiltration step instead of RO for the 1st stage.	
K4.18 Water & Sediment Quality Appendix	K4.18.2 Water Treatment	K4.18-52	Brine from WTP#2 in Closure Phase 1 is stated in the PFEIS to go to the pit. WTP#3 is stated to be treating water from the open pit while it is being backfilled in Closure Phase 1. The brine from WTP#3 is indicated to be evaporated and the crystalline salt disposed of elsewhere.	It is not clear why brine would be added to the pit to then essentially be retreated by WTP#3 and then be crystallized and disposed of elsewhere. We recommend adding a rationale for this aspect of water treatment residual management to the FEIS and/or re-evaluating the plan for the pit brine during Closure Phase 1 before releasing the FEIS.	
K4.18 Water & Sediment Quality Appendix	K4.18.2 Water Treatment	K4.18-53	Regarding: "WTP #3 would house separate treatment processes for surplus water from the bulk TSF and main SCP in closure phase 3 (closure years 20 and beyond), and from the pit lake in closure phase 4 (closure year 50 and beyond)..."	We recommend clarification of this point in the FEIS. Currently, it appears that pit water would not be treated in Closure Phase 3 and that SCP and bulk TSF water would not be treated in Phase 4, but later text on the same page indicates that the circuit to treat the pit water would be constructed prior to Closure Phase 3. Both are included on Figure 2-15.	
K4.18 Water & Sediment Quality Appendix	K4.18.2 Water Treatment	K4.18-53	Brine from WTP#3 in Closure Phases 3 and 4 will be disposed of in the pit.	We recommend clarifying in the FEIS why brine is being treated differently in different phases of closure.	
K4.18 Water & Sediment Quality Appendix and Chapter 2 Alternatives	Figure 2-16 Water Treatment Plant #3 Process Schematic Closure Phases 3 & 4 (Open Pit Stream)	K4.18-54 references figure	Regarding: "*Influent water from Open Pit WMP*"	It appears that this should be the Open Pit, rather than the water management pond. We recommend revising the wording in the FEIS.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
K4.18 Water & Sediment Quality Appendix	K4.18.2.5 Review of WTP Methodologies	K4.18-55	Regarding: "The literature references provided for this technique in PLP 2019-RFI 021h are dated and do not align with the North American Metals Council white paper on selenium removal technologies (CH2MHill 2010, 2013), which indicate that biological removal is the preferred and most demonstrated means for removal of selenium from wastewaters." We note that the NAMC white paper (2010) and addendum (2013) provide reviews of various technologies - chemical, physical, and biological - that have potential to remove selenium. The papers do not indicate that biological removal is preferred, nor that it is the most demonstrated means for selenium removal. A statement in the more recent 2013 document (and similar to a statement in the 2010 document) is "*While these physical, chemical, and biological treatment technologies have the potential to remove selenium, very few technologies have successfully and/or consistently removed selenium in water to less than 5 µg/L at any scale. Still fewer technologies have been demonstrated at full-scale to remove selenium to less than 5 µg/L, or have been in full-scale operation for sufficient time to determine the long-term feasibility of the selenium removal technology* ." Also, "*No single technology has been demonstrated at full-scale to cost-effectively remove selenium to less than 5 µg/L for waters associated with all industry sectors. Therefore, performance of the technology must be demonstrated on a case-specific basis* ."	We recommend revising the statement in the FEIS to more accurately reflect what is presented in the NAMC papers and to include a statement that biological treatment methods also require specific operational conditions for effectiveness and may differ from operational conditions conducive to removal of other ions. It is true that the references in RFI 021h are older and that biological treatments have had more attention in more recent years; however, the NAMC papers do not indicate that biological treatment is preferred or that it is the most demonstrated means for removal. Also, biological (active and passive) treatment of selenium requires vigilance similar to that for chemical treatment methods in assuring that parameters (e.g., Eh [ORP] and pH) remain in ranges conducive to conversion of mobile selenium species to immobile ones. Depending on the specific technology, other parameters also may become important.	
K4.18 Water & Sediment Quality Appendix		Table K4.18-13 Table K4.18-14 Table K4.18-15 Table K4.18-	Regarding the following data: Chloride 3.271 157.83 Chloride 11.18 40.72 Chloride 9.25 79 Chloride 2.00 58 We note that there is one mention of ferric chloride use in Section 4.18, which does not discuss that the chloride concentration in wastewater might increase because of it.	EPA recommends that the FEIS include an explanation of why chloride levels increase during treatment, even if the levels indicated do not exceed WQ criteria.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
K4.18 Water & Sediment Quality Appendix		Table K4.18-13 Table K4.18-14	The inflowing Hg concentrations to the WTP are 220 to 413 ng/L according to Table K.4.18-13 and K.4.18-14. The outflowing concentration is expected to be 0.016 ng/L. It is worth noting that the typical detection limit for low-level Hg analysis is 0.5 ng/L. As such, the predicted outflow water concentration is an order of magnitude lower than what can be measured. Appendix K4.18 states: "The documents do not include specifics as to the operating conditions, and do not show intra-plant treatment approaches, but rather focus on the overall mass balance for each treatment plant…It should be disclosed that the [WTP] approaches have not been demonstrated elsewhere at the scale of the Pebble mine, and the specific configurations of treatment processes have not been commercially demonstrated." Elsewhere in the document, a paper from the South River in Virginia is used to indicate that most Hg is bound to particles (See Flanders et al., 2010 reference). If it assumed that most of the inflowing Hg is bound to particles and that predictions of WTP efficiency are based on particle-bound Hg removal, this would greatly overestimate Hg removal by the WTP. We note that the modeling that was used to develop the Hg concentrations in water flowing into the WTP is based on dissolved-phase concentrations since the Humidity Cell Tests only measure dissolved constituents.	We recommend that the FEIS provide the specific details on the aspects of the WTP technologies that will be utilized to obtain such a low Hg concentration. Given the uncertainty surrounding the WTP technologies, we recommend providing specific information to explain how concentrations of 0.016 ng/L of Hg are achievable.	
K4.18 Water & Sediment Quality Appendix		Table K4.18-16	Regarding the following data: Sulfate 173 173 Potassium 2.8 12.8	EPA recommends including a narrative explanation of why the treatment indicated in the Table of WTP #3 (Open Pit Stream in Closure Phase 4) shows no treatment of sulfate and an increase in the levels of potassium. This is not predicted in any other phase of treatment nor by any other WTP.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
K.4.18 Water & Sediment Quality Appendix		K4.18-70	Regarding: "Additional surface water modeling was performed to provide a more conservative and comprehensive analysis of impacts of fugitive particulate deposition to surface water bodies in conjunction with the release of treated effluent water. This approach, further described in AECOM (2019h), examines Frying Pan Lake as a differential mixing problem, which is used as a proxy for analyzing impacts to other mine site waterbodies." We appreciate the additional analysis on the impacts of fugitive dust in the PFEIS, and have some comments/concerns about the approach used. First, Frying Pan Lake is used to model the impacts of dust deposition on water concentrations, which is extrapolated to the potential impacts on area streams. The volume and surface area of the lake are important variables in this calculation; however, there is not a discussion about how these characteristics compare to area streams. This section of the text indicates that it provides “a more conservative and comprehensive analysis of impacts of fugitive dust” but does not discuss how using the properties of a lake are representative of the properties of the area streams and how this extrapolation is conservative. If the depth to surface area of Frying Pan Lake is larger than area streams, then this could underpredict the concentrations observed in the streams. Furthermore, the model does not fully account for dust deposition to the watershed and subsequent mobilization into streams via erosion processes (e.g. the text states: “This approach is independent of watershed surface area contributing to recharge, and it is uncertain whether the increase in recharge concentrations sufficiently accounts for the potential role of erosion in	For the reasons discussed in the comment, we disagree with the premise that this analysis is both conservative and comprehensive in its ability to capture the impacts of fugitive dust releases on water quality. We recommend that the fugitive dust model be revised in the FEIS to: 1) be representative of the volume of water in area streams; and 2) include the impacts of dust deposited to stream watersheds and how this dust would be more mobile than represented by baseline sediment and soil conditions.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.27 Spill Risk	diesel spill from marine tug-barge; tanker truck diesel spill; diesel spill from marine tug-barge allision; Iliamna Lake ferry diesel spill; concentrate slurry pipeline rupture	4.27-12; 4.27-16; 4.27-25; 4.27-41; 4.27-65	Each of these spill scenarios provides estimated annual probabilities for both 20 years and 78 years. The other scenarios do not provide information for 78 years. The 78 years would pertain to cumulative effects from an expansion and therefore the probabilities of release up to 78 years is relevant.	We recommend that the FEIS explain why the estimated spill probabilities for both 20 years and 78 years was developed for the scenarios identified in the second column but not for the other scenarios (including natural gas release, concentrate spill from truck rollover, marine vessel concentrate release, Iliamna Lake Ferry rupture, reagent spills, tailings release, and untreated contact water release).	
4.27 Spill Risk	4.27.6.3	4.27-49	We appreciate the addition of information to clarify conditions for acid generation and metals leaching. The bullets provide a concise description of major factors controlling acid generation and metals leaching. It is stated that the buffering capacity varies across the analysis area. pH also varies depending on the location within the area (noted as acidic in some reaches of NFK) and the 2 parameters are not synonymous. Buffering capacity is the ability of the water to resist a change in pH from addition of an acid or a base, not necessarily what causes an existing pH. The existing pH is what can influence mineral	We note that materials that enter a stream reach that is acidic will experience dissolution of minerals faster than in reaches having neutral pH. We recommend noting (in the third bullet) that pH also is variable in waterbodies in the areas that could be affected by a spill and change the reactivity of spilled materials.	
4.27 Spill Risk	4.27.6.3	4.27-49	Fifth bullet states: "*Buffering capacity: Waters that are saturated in minerals have buffering capacity against metals leaching*." It is not clear what this statement means. It is true that minerals contribute to the buffering capacity, but it is pH that will control metal leaching, depending on the particular metal. Buffering capacity is the capacity to resist change to the existing pH from addition of an acid or a base.	We recommend that the EIS clarify what is meant by this bullet or perhaps simply provide the definition of buffering capacity.	
4.27 Spill Risk	4.27.6.3	4.27-49	Regarding: "*Buffering capacity is variable in waters across the analysis area*."	We recommend providing additional clarity by stating that the alkalinity is low (stated as low, and range of means by watershed given as 17-32 mg/l in section 3.18) in surface waters in the study area.	
4.27 Spill Risk	4.27.6.4	4.27-51 and 4.27-54	The PFEIS states: "*As described below under Mitigation, the concentrate pipeline would have a full internal liner that would protect against both internal and external corrosion.*" On Page 54, an internal liner is discussed for prevention of internal corrosion and a cathodic protection system is stated for prevention of external corrosion.	We appreciate the additional information added to clarify internal and external corrosion mitigations. It is not clear how an internal liner would protect against external corrosion, and it is not stated to on Page 54. We recommend that this be clarified for consistency.	
4.27 Spill Risk	4.27.6.6	4.27-53	Regarding: "Each container would then have its exterior cleaned with a vacuum or spray system at the port site prior to being returned to the mine for refilling."	We recommend that the FEIS include information regarding how the wash water (if using spray system) will be managed and the dust captured (if using vacuum).	
4.27 Spill Risk	4.27.6.7	4.27-54	The concentrate truck spill scenario assumed a spill of 80,000 pounds. This was partially based on the database of concentrate spills along the Red Dog haul road, which included a maximum spill release of 145,000 pounds in 2015. The diesel spill scenario in the PFEIS used the maximum spill volume on the Dalton Highway. The PFEIS does not explain why the concentrate truck spill scenario did not similarly use the maximum spill release from the Red Dog haul road. In addition, no basis is provided for the PFEIS assumption that 10% of the spilled concentrate would spill into a stream. We note that we submitted this same comment on the DEIS, but it does not appear to be addressed in the SOC responses (PFEIS, pg. D-201).	We recommend that the concentrate spill scenario assume a 145,000 pound spill (based on the maximum reported spill on the Red Dog road). Alternatively, we recommend that the EIS explain why the maximum reported spill was not used for concentrate even though it was for diesel. In addition, we recommend that the EIS provide the basis for the assumption that 10% would spill into a stream or instead assume that a range of percentages could occur.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.27 Spill Risk	4.27.6.7 Acid Generation	4.27-57 and 4.27-68	Regarding: "*However, to produce acid, the sulfur needs to be oxidized; that is, combine with oxygen. A small amount of oxygen can be dissolved in flowing water, and almost no oxygen would be present in still or stagnant water*." Oxidation is 1) combining an element with oxygen or 2) losing electrons. Microbial oxidation of pyrite is known to occur in sub-oxic and anoxic environments. An example is microbial nitrate reduction coupled with pyrite oxidation.	We recommend revising both sections to remove the "that is, combine with oxygen", as taken with the subsequent sentences this implies oxidation in water would only occur in the presence of dissolved oxygen, which is not correct.	
4.27 Spill Risk	4.27.6.7 Acid Generation	4.27-57	Regarding: "*As long as concentrates remain under water, acidic conditions would not be likely to occur.* " While it is true that widespread (whole water body) acidic conditions would not be likely, localized impacts would be expected on the benthos.	We recommend that the FEIS include information about the potential for impacts to the localized benthic environment.	
4.27 Spill Risk	4.27.6.7 Pipeline rupture / soils and water & sediment. And, wetlands and other waters section on p. 69	4.27-67 and 4.27-69	The sections for soil and sediment capture the impacts of the solid phase of the concentrate slurry, but don't capture what happens with the 45% liquid phase - seepage into soils, potential for sorption of metals onto the soils, toxicity to benthic organisms, etc. This is true also for the section on wetlands.	We recommend that the FEIS discuss the potential impacts from the concentrate slurry water phase on soils, sediments, and wetlands.	
4.27 Spill Risk	4.27.8.2	4.27-82	Regarding: "*The predicted pH of pyritic TSF supernatant fluid at the close of operations would be 7 to 8 (Knight Piésold 2018a).*" From the cited source (KP 2018a): "pH values were based on the range of pH indicated in the geochemical source terms (SRK 2018)." From SRK 2018: "pH was not modelled and pH values are based on the range of pH source terms provided by SRK (dated 20 June 2018)." We note that 1) pH was not modelled (the hydrogen ion concentration also was not modelled for converting back to pH); 2) the only supernatant pH value provided in SRK 2018 (from KP 2018a) is for the bulk tailings water.	We recommend that this statement be revised since pH was not modeled.	
4.27 Spill Risk	4.27.8.3 Acid	4.27-86	Regarding: "*Supernatant fluids in the TSFs are predicted to be relatively neutral, with a pH of 7 to 8 (Knight Piésold 2018a)*."	As above, we recommend that this statement be revised since pH was not modeled.	
4.27 Spill Risk and Appendix K4.27	4.27.8.6 K4.27.2.8	4.27-91 K4.27-10	The EIS spill scenarios do not include a breach of the bulk TSF embankment based on the Failure Modes Effects Assessment (FMEA) conducted in 2018. EPA provided comments on the DEIS recommending that a failure scenario be developed for essentially four reasons: (1) the conceptual nature of the current TSF design makes it difficult to accurately assess risk; (2) the FMEA did not assess the confidence level of the likelihood of failure modes as is typically done, and therefore the confidence in the FMEA prediction that a breach is very low is unknown. If there is an unknown or low level of confidence in the FMEA conclusions, then perhaps the FMEA should not be used as the sole basis for determining whether to conduct a breach analysis; (3) we pointed to recent literature that even well designed dams can and do fail; and (4) tailings dam failure was a significant issue raised in EIS scoping and warrants in depth analysis. We appreciate that the Corps has included additional information related to this topic in Sections 4.15, 4.27, and K4.27. However, the information does not fully address these four main concerns. In addition, some of the new information raises additional concerns. In particular, statements made in AECOM's independent review (AECOM 2019n) raise the possibility that the bulk TSF embankment could fail in the downstream direction (which contradicts previous statements that the embankment would only fail in the upstream direction) and statements in the PFEIS identify uncertainties in the ability of the tailings to drain sufficiently and maintain a low phreatic surface (pg. K4.27-9) (see also our comment on section 4.15.3.1). These concerns based on the new information further our recommendation to include a bulk TSF dam failure scenario in the EIS.	As stated in the PFEIS, "there is much uncertainty in evaluating the stability of the mine site embankments based on a conceptual-level of design" (PFEIS, pg. 4.15-11). We appreciate the new information developed between the draft EIS and PFEIS and AECOM's independent review. However, in light of the serious potential impacts, we we continue to recommend that the EIS include a breach scenario for the bulk TSF due to the four reasons described in the comment and the additional uncertainties raised in AECOM 2019n. Including a bulk TSF failure scenario in the FEIS will allow for disclosure of impacts to water quality and aquatic resources. In addition, we recommend that the Corps consider whether the FMEA results should be reassessed given the new information developed since the FMEA was conducted (such as the bulk TSF dam seismic analysis, AECOM's independent review, etc.) to determine whether there are changes in the likelihood of the failure modes or whether confidence can be estimated.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.27 Spill Risk	4.27.8.8 Pyritic TSF Design Features	4.27-94	Regarding: "*Predicted pH of the bulk tailings supernatant fluid at the end of the 20-year operational life of the mine is 7 to 8 (Knight Piésold 2018a).*"	As above, we recommend that this statement be revised since pH was not modeled.	
4.27 Spill Risk	4.27.8.9 Scenario: pyritic tailings south embankment release into the SFK / water and sediment quality / surface water quality / acid	4.27-124	Regarding: "*Supernatant fluid would have a relatively neutral pH of 7 to 8 (Knight Piésold 2018a)...* " when discussing pyritic TSF spill	As above, we recommend that this statement be revised since pH was not modeled.	
4.27 Spill Risk	4.27.9.2	4.27-138	Regarding: "*The predicted pH of contact water would vary from 7 to 8;...*"	As above, we recommend that this statement be revised since pH was not modeled.	
4.27 Spill Risk	4.27.8.9 concentrate slurry spill - fish	4.27-71	Regarding: "An undiluted aqueous sample from the mine site that was used in the toxicity studies described for the pyritic tailings release (Nautilus Environmental 2012) is also representative of the contact water that would make up the concentrate slurry. The toxicity tests did not demonstrate acute and chronic toxicity to fish species, including rainbow trout (O. mykiss) and fathead minnow (P. promelas). Although no impact was observed on survival of water flea (C. dubia) neonates, their reproduction was adversely affected when exposed to 12.5 percent or higher aqueous sample (by volume); or 8 times dilution or less." If this water is the non-gold plant tailings in the cited reference, there were acute toxic effects shown by the LC50, being that of the 100% sample - 50% of the organisms died (Table 6); and the 50% sample also had mortality. There were also chronic lethal effects observed, with 30% mortality in Table 7, although this was determined to not be statistically significant (which seems odd to the EPA, given the 30% mortality; we note that raw data have high variability). "No impact" would mean that there were no differences between species tested and control species.	We recommend that the FEIS include the following: 1) Clarification of which water sample in the reference is being discussed. 2) Rationale/support that the water sample is representative of the concentrate slurry contact water (e.g., did the sample include process reagents?). State which sample type from Table K3.18-4 is represented. Additionally, Page K3.18-6 states that, "To date, limited geochemical testing has been performed on the representative concentrate because metallurgical process designs are still being evaluated", which suggests that the true composition of the concentrate slurry isn't known and is a concern. We recommending clarifying this in the FEIS. and, 3) Revise discussion to include that there were acute toxic effects to the C. dubia neonates in the 48 hour test, chronic lethal effects with data having high variability, and revise subsequent discussion on potential impacts on benthos that indirectly affect fish.	
4.27 Spill Risk	4.27.8.3 Acid Tailings solids	4.27-86	Regarding: "Geochemical studies on rocks from the mine site indicate that PAG material present in the tailings may require up to 40 years under local conditions to generate acid (SRK 2018a)." We note that the SRK reference doesn't state a 40 year requirement to generate acid for any material. It states "Some PAG components will become acidic as soon as exposed to oxygen but the median on-set period is 10 years (under site conditions). All PAG rock is expected to be acidic after 20 years of exposure unless managed to limit oxygen availability."	We recommend revising the text of the FEIS to reflect what is stated in the reference cited. This is important also when discussing times for potential acidity and metals leaching from the solids in TSF failure scenarios (especially the pyritic TSF).	
4.27 Spill Risk	4.27.8.3 Metals Tailings solids	4.27-87	Regarding: "Some stretches of the NFK are naturally acidic (Section 3.18, Water and Sediment Quality). Therefore, the potential for ML would depend on acid generation from the tailings." We note that the potential for ML will be a function of both the waterbody's pH (depends on location of the spill) and the acid generation from the tailings.	We recommend that the text of the FEIS be clarified to mention the function that pH plays as well.	
4.27 Spill Risk	4.27.8.9 bulk tsf spill - water and sediment - sediment	4.27-106	The discussion on sediments doesn't address localized impacts to benthic organisms. Additionally, as tailings particles are washed further downstream, they will be incorporated into those environments and have longer term effects that may reach outside the study area.	We recommend that the EIS include the potential for localized toxic impacts (outside of smothering) to sediment-dwelling/benthic organisms, which are important to fish.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.27 Spill Risk	4.27.8.9 bulk tsf spill - fish	4.27-110	"*Tailings submerged in the stream would not be susceptible to acid generation, because the water would prevent oxidation of the sulfide minerals.*" It's been accurately presented earlier that streams will contain dissolved oxygen and that streams have flowing water. The flowing water may dilute any formed acid and not give a net result of an influence on the larger water body. There may be a local influence on the benthos, however, or on longer-term impacts if the particles are washed downstream.	We recommend that this sentence be revised for accuracy and consistency with other discussions.	
4.27 Spill Risk	4.27.8.9 bulk tsf spill - fish	4.27-111	Regarding: "However, site-specific toxicity tests (as discussed subsequently) are indicative of limited impacts on fish species. An undiluted aqueous sample from the mine site was used in aquatic toxicity studies (Nautilus Environmental 2012). The bioavailability of metals in the test sample may be representative of the tailings fluids released under this spill scenario. As described subsequently, the toxicity tests did not demonstrate acute and chronic toxicity to fish species, including rainbow trout (Ochorhynchus mykiss) and fathead minnow (Pimephales promelas) in 4- and 7-day exposures, respectively. Although no impact was observed on survival of water flea (Ceriodaphnia dubia) neonates, their reproduction was adversely affected when exposed to 12.5 percent or higher aqueous sample (by volume); i.e., at 8 times dilution or less." If this water is the non-gold plant tailings in the cited reference, there were acute toxic effects shown by the LC50 being the 100% sample - 50% of the organisms died (Table 6); the 50% sample also had mortality. There were also chronic lethal effects observed, with 30% mortality in Table 7, although this was determined to not be statistically significant (which seems odd with 30% mortality, and raw data have high variability). No impact would have had no difference from the controls. This discussion needs clarification and support. See suggested changes in wording in row 18 above - they apply here as well.	We recommend that the EIS: 1) Clarify which water sample in the reference is being discussed. 2) Provide rationale/support for why that sample is representative of the bulk TSF tailings water, and disclose which sample type is represented from Table K3.18-4; and, 3) Revise discussion to include that there were acute toxic effects to the C. dubia neonates in the 48 hour test and chronic lethal effects with data having high variability, and subsequent discussion on potential impacts on benthos that indirectly affect fish.	
4.27 Spill Risk	4.27.8.9 pyritic tsf spill - spill response	4.27-120	Regarding: "*Remedial actions under this failure scenario would include: Pumping water from the supernatant pond to the Main WMP following the initial breach to reduce the overall release volume.* " The scenario described on Page 115 states "***full release*** *of the supernatant pond*".	This is a valid remedial action to limit impacts from a breach, but with respect to the scenario it isn't clear what water would remain. We recommend that the FEIS clarify the remedial action under this failure scenario	
4.27 Spill Risk	4.27.8.9 pyritic tsf spill - metals contamination	4.27-122	Regarding: "*No measurable metals would be leached from deposited tailings solids because the process of ML would require decades*"	Previous discussions in other sections and subsequent discussion on sediments in this section use the more likely phrase "years to decades" when discussing metals leaching and acid, especially with respect to pyritic tailings. We recommend that this sentence be revised to include the phrase in the FEIS. Additionally, "no measurable" is subjective (measured by what instrument?) and depends on the amount of time the tailings solids remain associated with the soils. Eventually, all particles weather with smaller particles weathering faster. We suggest rephrasing to "metals would not be immediately leached...process of ML would require years to decades".	
4.27 Spill Risk	4.27.8.9 pyritic tsf spill - water/sed quality - sediment quality	4.27-127	Discussion does not include localized potential impacts to benthic organisms from slow release of metals/acid from any particles entrained in the sediment; effects on benthos will indirectly affect fish.	We recommend that this point be added to the discussion in the FEIS.	
4.27 Spill Risk	4.27.8.9 pyritic tsf spill - fish	4.27-130	Regarding: "*As described previously and shown on Figure 4.27-7, concentrations of several metals would exceed their WQCs in the downstream area…*"	The figure shows "dilution ratio achieved" and does not show concentrations. For clarity, we recommend adding text in this section (or to the figure legend) to define this ratio.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.27 Spill Risk	4.27.8.9 pyritic tsf spill - fish	4.27-132; 4.27-148 and 149 (Main WMP contact water spill); 4.27-71 (concentrate spill); 4.27-111 (bulk tailings spill)	Regarding: "*However, site-specific toxicity tests* ***are indicative of limited impacts*** *on fish species, as described below* ." "*In conclusion, the results of the aquatic toxicity tests on waterflea, fathead minnow, and rainbow trout indicate that acute impacts (lethality) on fish due to* ***metals toxicity would not occur*** *within the predicted time frame and extent of WQCs exceedances.* " "*...but site-specific toxicity tests (as discussed previously) are* ***indicative of limited impacts*** *on fish species* ." "*Metals bioavailability in the current evaluations presents uncertainties, but site-specific toxicity tests (as discussed below under Pyritic Tailings Release)* ***are indicative of limited impacts*** *on fish species.* " "*However, site-specific toxicity tests (as discussed subsequently)* ***are indicative of limited impacts*** *on fish species.* "	We recommend that, with the reliance on these toxicity tests in discussing impacts to fish (for all spill type sections), the FEIS provide a clear linkage/demonstration of how the water tested represents the spilled waters being discussed. Neither this chapter nor the Nautilus reference contains any information on the identities or concentrations of constituents in the toxicity test water samples. We recommend revising the EIS to include discussion of toxicity test sample representativeness in order to provide support for the conclusions.	
4.27 Spill Risk	4.27.8.9 pyritic tsf spill - fish	4.27-132	Regarding: "*One hundred percent of the juvenile rainbow trout survived when exposed to undiluted "Non-Gold Plant Process Water" (representative of tailings fluids) for 96 hours (Nautilus Environmental 2012). One hundred percent of fathead minnow neonates survived when exposed to undiluted aqueous sample for 7 days, and their growth was not inhibited (Nautilus Environmental 2012).* ***Survival of water flea (Ceriodaphnia dubia) neonates was also not adversely affected when exposed to undiluted aqueous sample for 7 days.*** *However, reproduction was adversely affected when exposed to 12.5 percent or higher aqueous sample (by volume), i.e., at 8 times dilution or less. Unlike the WQCs, which are based on toxicity of individual metals, the results of these toxicity tests represent exposure of the test organisms to a combination of metals in the sample. Therefore, results reflect a combined effect of the mixture of metals and other constituents in the tailings fluid, whether individual metals in a mixture act additively, synergistically, or antagonistically.*" There were acute toxic effects shown by the LC50 being the 100% sample - 50% of the organisms died (Table 6); the 50% sample also had mortality. There were also chronic lethal effects observed, with 30% mortality in Table 7, although this was determined to not be statistically significant (which seems odd with 30% mortality, and raw data have high variability). No impact would have had no difference from the controls. This discussion needs clarification and support.	We recommend that the EIS be revised to 1) Provide rationale/support for why that sample is representative of the pyritic TSF tailings water (especially since Chapter 3.18 points out that "the pyrite and gold plant tailings have higher sulfide contents; are often classified as PAG; and leach metals at higher rates") and evaluate and disclose the expected toxicity to fish and benthos, which indirectly affects fish. We recommend clarifying which sample type is represented from Table K3.18-4; and 2) Include discussion that there were acute toxic effects to the C. dubia neonates in the 48 hour test and chronic lethal effects with data having high variability.	
4.27 Spill Risk	4.27.8.9 contact water from main WMP spill - fish	4.27-149	Regarding: "An undiluted aqueous sample from the mine site that was used in the previously described toxicity studies (Nautilus Environmental 2012) is also representative of the contact water. The toxicity tests did not demonstrate acute and chronic toxicity to fish species, including rainbow trout and fathead minnow. Although no impact was observed on survival of water flea neonates, their reproduction was adversely affected when exposed to 12.5 percent or higher aqueous sample (by volume); or 8 times dilution or less. These results indicate chronic exposures for 7 days or more to tailings fluid at lower dilutions in the streams could have sub-lethal effects on sensitive aquatic species, but likely less so on fish species." There were acute toxic effects shown by the LC50 being the 100% sample - 50% of the organisms died (Table 6); the 50% sample also had mortality. There were also chronic lethal effects observed, with 30% mortality in Table 7, although this was determined to not be statistically significant (which seems odd with 30% mortality, and raw data have high variability). No impact would have had no difference from the controls. This discussion needs clarification and support. See suggested edits to this wording in row 18, above. Those may apply here as well.	1) We recommend that the FEIS verify which water sample is being discussed. Based on the discussion of the results, it is assumed that the water being referred to in the reference is the "non-gold plant process water". 2) We also recommend providing support/rational for why/how the tested water represents the contact water and which water it represents in the supernatant water results in Table K3.18-4; and 3) We recommend revising discussion to include that there were acute toxic effects to the C. dubia neonates in the 48 hour test and chronic lethal effects with data having high variability, and subsequent discussion on potential impacts on benthos that indirectly affect fish.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.27 Spill Risk	4.27.10.2	Table 4.27-3	It's stated on page 4.27-138 that "*Water management ponds and other water storage facilities at mine sites are generally not built to last beyond the operational life of a mine.*" The discussion of risks for expansion of the project doesn't include the potential for risks from the age of the main WMP, if it is designed for the current project's operational life.	We recommend including accurate information in the FEIS that there is the potential for increased failure risk from an aging main WMP. This is also a risk of aging TSFs, as is an increased potential for materials becoming acidic if there wasn't complete elimination of oxidation processes (by oxygen, microorganisms, or chemical oxidants).	
K4.27 Spill Risk	General		We appreciate inclusion of the new Appendix K4.27 in the PFEIS. The Appendix includes additional relevant and helpful information related to tailings dam failure. We offer several comments on this new information, below.		
K4.27 Spill Risk	K4.27.1.1	K4.27-2	The section on Upstream Dams vs Downstream and Centerline dams focusses on the advantages of centerline and downstream dams vs. upstream dams. However, this section is silent on the advantages of downstream dams vs. centerline dams and we recommmend that additional information be provided in the FEIS to allow for a more equitable comparison between all three dam types. We provided this recommendation at the DEIS stage and continue to believe that this is relevant, since a downstream dam is included in Alternative 2.	We recommend including a comparison in the FEIS of downstream vs. centerline dams in terms of stability and resilience and provide references to support the discussion.	
K4.27 Spill Risk	K4.27.2.5	K4.27-8	The PFEIS identifies three examples of flow-through centerline dams that are comparable to the Pebble design. However, two of these examples have low permeability vertical cores, which is not proposed for the Pebble TSF design.	We recommend that the PFEIS describe whether including a low permeability core similar to two of the comparable dams would be an effective mitigation measure to improve the ability to control dam drainage and maintain a low phreatic surface.	
K4.27 Spill Risk	K4.27.2.8	K4.27-10	See our comment on section 4.27.8.6 above related to the FMEA.		

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
General comment - throughout PFEIS			Maps in the PFEIS often under-represent known aquatic resources. Specific examples of this include: (1) the stream network shown in Fig 3.24-2 is much more limited than that shown in Fig 4.16-2; (2) The National Hydrography Dataset maps at the mine site and along the transportation corridor include many streams not shown on PFEIS maps of those same areas; (3) Fig 3.24-15 highlights anadromous waters but does not visibly show other known stream channels within and around the project area, which could misrepresent the hydrology of project area by suggesting that the anadromous waters shown in this figure are the only aquatic resources.	We recommend that all stream networks and other aquatic resources be consistently and clearly shown on all maps.
General comment - throughout PFEIS			Throughout the PFEIS, the mine site area is referred to as well-studied, with extensive data. For example on pg. 3.16-25, "The mine access road is in the well-studied UTC watershed, for which hydrologic, meteorological, and biological data are available". Unquestionably, the mine site area is well-studied and has extensive data available, relative to other remote, undeveloped areas in Alaska (this is less true along the proposed transportation corridor).	We recommend clarifying in the FEIS that statements about how well-studied these watersheds have been are relative - e.g., "the UTC watershed is well-studied compared to most remote, undeveloped watersheds in AK, for which data are largely lacking."
3.16 Surface Water Hydrology	3.16.1	3.16-3	In Table 3.16-1, it appears that "Channel Length" refers to mainstem channel length, but this is not clearly stated.	We recommmend clarifying that this represents mainstem channel length, not total stream channel length in the watershed.

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
3.16 Surface Water Hydrology	3.16.1.2	3.16-28	Data on surface water hydrology along the applicant's preferred alternative for the proposed transportation corridor are known to be limited. This known lack of data makes it difficult to assess whether statements in the PFEIS are accurate, such as, "Floodplain function and values are anticipated to be similar to those discussed above for the streams in the immediate vicinity of the mine."	We recommend acknowledging in the text that hydrologic data are spatially and temporally limited along the transportation corridor.
K3.16 Surface Water Hydrology Appendix	K3.16.1	K3.16-5	Table K3.16-2 states that: "One low flow measurement was made between March 7 and April 2 in each year in which measurements were made. All sites were not measured every year." We note that, because different sites were measured in different years, the values included in this table are not comparable across sites. They offer different snapshots at each site.	We recommend deleting the table, or at minimum clarifying that values are not comparable across sites because they represent different conditions across different years.
K3.16 Surface Water Hydrology Appendix	K3.16.7.2	K3.16-41	This section does not appear to consider differences in snowfall vs. rainfall, and how the relative timing of snowfall vs. rainfall will affect runoff and flows.	We recommend adding discussion in the FEIS about how potential changes in snowfall vs. rainfall and relative timing of snowfall vs. rainfall (e.g., rain falling on snow) would be expected to affect runoff, flows, and groundwater recharge.

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
2.2.4.1 Mine Site; Chapter 4.20 Air Quality	2.2.4.1	2-16	The ambient air boundary was not defined for the project in the EIS. Instead, a mine-site safety zone has been identified and will be enforced by signage at regular intervals. Ambient air quality impacts modeling was conducted assuming the ambient air boundary coincides with the mine-site safety zone. It is understood only the state of Alaska can determine and enforce the ambient air boundary. However, the air quality analysis in the EIS is highly dependent on the selection of the ambient boundary, because maximum impacts are shown to occur along the boundary. The EIS contains no documentation or discussion regarding fencing or other measures that will be proposed to the State of Alaska to enforce the ambient air boundary. Chapter 2.2.4.1 states that signage at regular intervals will be used along the boundary; no other measures are described. Based on EPA's ambient air policy (https://www.epa.gov/nsr/ambient-air-guidance), which the State of Alaska must apply, signage at regular intervals may not be a sufficient measure to preclude public access without additional security measures in place.	We appreciate the brief explanation of the Mine Site Safety Boundary that has been added to Chapter 2. We recommend that the FEIS include additional information that outlines the ambient air boundary that would be proposed to the State of Alaska, including the location and measures to be used to enforce an ambient air boundary around the mine site. Recognizing that the State of Alaska will determine the ambient air boundary during permitting, this information would help to confirm the location of the ambient air modeling receptors nearest to activities at the mine site and ensure that impacts predicted in the NEPA analysis are accurate.	
4.20: Air Quality	Table 4.20-1: summary of key issues for air quality resources	4.20-3	The conclusion that Port Site operations air quality impacts would be minimal is not necessarily supported by the air quality assessments provided in Appendix K or the associated modeling report provided in RFI.009.9-6-2018. The modeling assessment implied 1-hour NO2 impacts could exceed the 1-hour NO2 AAAQS (implied, based on the AERSCREEN results in the modeling report) and annual NO2 impacts are at 90% of the NAAQS before considering the contribution of project mobile sources.	The EPA recommends that it would be best practice to provide a refined NO2 modeling study of the Port sites using AERMOD and representative meteorology, in place of the current AERSCREEN analysis. AERMOD is the EPA-preferred regulatory model under 40 CFR Part 51, Appendix W for near-field industrial source assessments. AERMOD also can apply local representative meteorological inputs, instead of the conservative idealized meteorological inputs used in AERSCREEN. We recommend that the assessment of the Diamond Point and Amakdedori Port sites be conducted separately, unless it can be shown that the assessment at one location is sufficient to address the range of impacts at both sites. We recommend that the assessment address both 1-hour and annual NO2 impacts.	
K4.20: Air Quality, Appendix K	Table K4.20-7; Amakdedori Port Ops. Emissions	K4.20-8	The PM2.5 emissions reported in the table appear incorrect. It appears this is an entry error, since the PM2.5 emission numbers match the NO2 emission numbers and because PM2.5 emissions could not exceed PM10 emissions.	The EPA recommends a review and possible correction of the table.	
K4.20: Air Quality, Appendix K	Table K4.20-4; Transportation Corridor Construction Emissions	K4.20-5	The emission inventory contains 1835 tpy of PM10 fugitive dust emission during construction, but assumes PM2.5 emission is not applicable. A fraction of fugitive dust will be within the PM2.5 size range, and estimating the portion of PM10 fugitive dust that is PM2.5 would improve the accuracy of the emission inventory.	The EPA recommends a review and possible revision of the PM2.5 emissions from transportation corridor construction.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
K4.20: Air Quality, Appendix K	K4.20.2 Direct Impacts, Amakdedori Port, Operations	K4.20-23	The annual NO2 impacts of the source are 90% of the annual NAAQS. We understand from the modeling report, only stationary source emissions are accounted for in the modeling (accounting for 53.8 tpy of emission). We appreciate that shore power has been integrated into the Port design plan as an applicant committed measure; this action will work to lower the ambient impacts of NO2 and other air pollutants in the area of the Port. It is not clear if the estimated 265 tpy of NOx emissions from mobile and non-road sources at the Port accounts for the reduction in emissions due to the availability of shore power. In a cumulative NAAQS/AAAQS assessment for NSR, it is important to include emissions from all project sources (point, mobile, and fugitive) to ensure compliance with the standards.	The EPA recommends a review of the mobile emission inventory to confirm if the 265 tpy of NOx emission does or does not account for a reduction due to the implementation of the shore power mitigation measure. Regardless of the magnitude of the NOx emissions, we continue to recommend that the mobile and non-road sources be included in the modeling assessment to provide an accurate estimate of air impacts at the site and support conclusions made in the EIS.	
K4.20: Air Quality, Appendix K	K4.20.2 Direct Impacts, Amakdedori Port, Operations	K4.20-23	The assessment only considers annual NO2 impacts and demonstrates a high impact (90% of annual NAAQS); also, mobile and non-road source emissions were not accounted for in the modeling. From these observations, we can assume that the 1-hour NO2 impacts could be significant at the Port site and therefore we recommend that those impacts be assessed and disclosed in this EIS. We note that the AERSCREEN modeling included in the modeling report resulted in a concentration of about 900 ug/m3, which greatly exceeds the AAAQS standard of 188 ug/m3. It is understood Alaska MNSR rules don't require 1-hour NO2 modeling as part of an air permit application unless the State explicitly requests such an assessment. The State may require modeling in cases where 1-hour NO2 impacts could be of concern, since the State must ensure source compliance with NAAQS and AAAQS before issuance of an air permit. It can be projected that, based on these high annual NO2 impacts, this could be a case where the State might require a 1-hour NO2 analysis. The EPA continues to emphasize the importance of assessing air quality impacts as part of NEPA for all criteria pollutants with significant emissions, regardless of the State requirements for material required in an air permit application.	The EPA continues to recommend that 1-hour NO2 modeling of Amakdedori Port Operations be conducted, in addition to the annual NO2 modeling, to analyze and disclose the expected impacts to ambient air quality. The preliminary AERSCREEN modeling included in the EIS suggests the Port facility emissions could result in exceedance of NO2 standards. If impacts are shown to exceed the AAAQS, then additional mitigation measures will need to be proposed to ensure compliance with standards. The AERSCREEN-based approach used for this assessment relies on highly conservative meteorology. We recommend conducting an NO2 assessment using AERMOD, with a representative meteorological dataset. AERMOD is the EPA-preferred regulatory model under 40 CFR Part 51, Appendix W for near-field industrial source assessments. AERMOD also can apply local representative meteorological inputs, instead of the conservative idealized meteorological inputs used in AERSCREEN. If there are questions regarding how to conduct this AERMOD assessment, the EPA is available to discuss.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
RFI 007b			We appreciate the updated Emissions Inventory information presented in RFI 007b, and have the following comments/recommendations:	(1) Regarding Table 12, Appendix A-2; Table 12-13 Appendix B; Table 12 Appendix C-2: The EPA notes that MOVES2014b should be used to generate emission factors for all on-road and off-road mobile sources. Please update all mobile source emissions factors produced with MOVES2014b. There is no need, for example, to use Table C-2 out of 40 CFR 98, which has to do with stationary sources, as a source for mobile source emission factors. In addition, we recommend that in-use emissions be used rather than engine certification standards for modeling of air quality impacts, to avoid underestimating the emissions. (2) We recommend modifying the title of Appendix A-3 to reflect the use of AP-42 to calculate fugitive emissions. (3) Regarding Tables 3-8 in Appendix B: We note that AP-42 Volume 2 is inappropriate for use in any calculation because it was retired several decades ago, and is not maintained by EPA. EPA recommends that project proponents refer to sources of emission factors listed in the FAA's "Aviation and Air Emissions Handbook, Version 3" (updated in 2015) (https://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/media/Air_Quality_Handbook_Appendices.pdf). This document discusses potential modeling approaches to determine aircraft emissions, but also provides links to sources of emission factors.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.15	Table 4.15-1	4.15-2	Table 4.15-1 presents the static factors of safety for each alternative, but does not include the factors of safety under seismic (pseudo-static) conditions, which is as important as the static safety factors. In addition, the table does not summarize how these factors of safety compare to federal and state requirements and guidelines.	We recommend that the table be revised in the FEIS to more comprehensively highlight key issues pertinent to stability by including: (1) the seismic factors of safety for the TSF and WMP embankments for each alternative; (2) downstream slopes for the TSF and WMP embankments for each alternative; and (3) the ADSP and FEMA guidelines and industry best practices on factors of safety and downstream slope requirements for comparison. We believe this information will facilitate comparison of key issues related to structural stability of the project structures and alternative. Stability is critical to reducing risks and consequences of tailings and WMP dam incidents to water quality and aquatic resources.	
4.15 and K4.15	Table 4.15-1 and general discussions related to FoS and stability in section 4.15 and appendix K4.15	global to 4.15 and K4.15	PFEIS Appendix K4.27 states "Acceptably reliable FoS values for the bulk TSF main embankment cannot be calculated at this time because of current data gaps in knowledge of the geotechnical characteristics of the tailings and the embankment fill that would be determined with more accuracy during the advanced stages of the bulk TSF design." (pg. K4.27-18). If reliable FoS values cannot be calculated, it is not clear why FoS values are presented in Sections 4.15 and other places in the PFEIS (4.27, K4.15) and relied upon in the summary discussions as a basis for concluding that there is a low probability of instability. We see value in providing FoS values since this is one of the criteria that is typically used to evaluate dam stability.	We recommend: (1) that the highlighted sentence from Appendix K4.27 be discussed in Section 4.15 and that the FoS values presented in Table 4.15-1 and throughout the FEIS be qualified so that it is clear that these are preliminary values; and (2) that the FEIS discuss whether the preliminary FoS values limit the ability to compare stability differences between the centerline and downstream dam alternatives.	
4.15 and K4.15	4.15.3.1, Seismic Stability Analysis	4.15-15 to 4.15-16	We appreciate that the PFEIS includes new information related to stability of the bulk TSF which was responsive to some of our DEIS comments. We appreciate AECOM's independent review of PLP's bulk TSF post-liquefaction analysis (AECOM 2019n). We are concerned that AECOM's review indicated that aspects of the analysis were not conservative and that there are some outstanding questions that seem relevant. These uncertainties are included in PFEIS Section 4.15.3.1. However, the PFEIS does not describe how the uncertainties impact the conclusions of the analysis. In other words, it is not clear whether the uncertainties are so significant that it could result in different conclusions in the risk analysis and EIS geotechnical stability analysis (e.g., that there is a higher probability that the TSF could fail in the downstream direction). The following statements in AECOM 2019n imply that the post-liquefaction analysis is not conservative, but instead is based on optimistic assumptions, which calls into question the conclusions of the analysis: - "we are also concerned that more of the centerline part of the embankment below just the most recent raise could slide into potentially undrained tailings, setting the mass in motion with adverse consequential effects on the TSF in a downstream direction." - "Because several assumptions in the above analyses may be optimistic, the calculated FoSs are generally considered to be results based on effectively best-case or normal operating conditions, indicating that some potentially high-risk situations have not been evaluated." -"Therefore, calculated displacements based on the Bray method should be considered an underestimation in the event of tailings liquefaction or high embankment pore pressures." - " We remain concerned that there are uncertainties as to whether the 55 percent thickened tailings planned by PLP would segregate enough to promote reduction of the phreatic surface near the embankment, which translates to uncertainties regarding the effect of tailings segregation on embankment stability." and "The ability to operate as a flow-through drained facility can only be confirmed with Pebble-specific tailings testing." -"Thus, the calculated FoS and associated key or deformations are conditional on relatively optimistic assumptions, which overstate embankment stability and underestimate risk if the planned embankment flow-	AECOM's independent analysis recommends that stability analysis be rerun based on additional testing and more conservative conditions (pgs. 8 -9 of AECOM 2019n). Given that tailings dam stability was one of the most significant issues raised in scoping and DEIS comments and is related to reducing risks and consequences of tailings dam incidents to water quality and aquatic resources, we recommend that a more conservative analysis be performed prior to the release of the FEIS that includes implementing the recommendations in AECOM 2019n. If this is not done, then we recommend that the main text of the FEIS (pages 4.15-15 - 16) describe the ~~overly~~ optimistic aspects of the current analysis identified in AECOM 2019n and describe how the optimistic aspects impact the EIS conclusions related to stability.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.15 and K4.15	Seismic Stability Analysis	4.15-15 K4.15-49	AECOM's independent review cited in the above comment recommends additional studies and evaluations to reduce uncertainties. Design and management changes could also reduce uncertainties. One of the key concerns identified in AECOM 2019n is the uncertainty as to whether the thickened tailings would segregate enough to promote reduction of the phreatic surface, which translates to uncertainties regarding the effect of tailings segregation on stability. A design measure that is commonly used to control tailings segregation is cycloning the tailings before thickening and selective placement of thickened fines and sands within the bulk TSF impoundment. Cycloned tailings may allow better control of tailings segregation, resulting in better control of the phreatic surface.	Given the concerns identified in AECOM 2019n, we recommend that the Corps also consider and disclose in the FEIS whether design changes or mitigation measures would be warranted to reduce uncertainties and improve stability. We specifically recommend that cycloning be considered as a mitigation measure to ensure control over tailings segregation in the bulk TSF since tailings segregation is important for maintaining stability. In addition, we recommend that the FEIS describe whether the downstream dam alternative provides resilience regarding these concerns. Stability is critical to reducing risks and consequences of tailings dam incidents to water quality and aquatic resources.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.9 Subsistence	3.9	3.9-1, paragraph 3.	The PFEIS discusses the cultural importance of traditional foods, but not their nutritional values.	We recommend adding information on the nutritional value of traditional foods to the FEIS. See https://www.ars.usda.gov/ARSUserFiles/80400525/Articles/EB05_AlaskaFoods.pdf	
3.9 Subsistence	3.9	3.9-1 , paragraph 3.	We note that most of the second half of the paragraph reflects broad assumptions that may not be supported by social science research on subsistence lifestyles and rural Alaska's economy. For example "For many, subsistence is a lifestyle, preferred over or in conjunction with a wage-earning lifestyle."	We recommend editing this paragraph to remove unsupported statements or provide support for the statements and conclusions.	
3.9 Subsistence	3.9	3.9-2	The first paragraph discusses the sharing structure of traditional subsistence; that food are shared with elders, single mothers, young couple and others. Our concern is that loss of access to traditional foods may have disproportionate impacts on the most vulnerable members of the community.	We recommend that the FEIS discuss the implications-of lack of access to traditional harvest areas and foods to vulnerable community members. For example, we recommend that the FEIS include a discussion of what replacement foods will be, where they will come from, at what cost, and how this potential impact will be monitored and potentially mitigated.	
3.9 Subsistence	3.9	3.9-2	The second paragraph discusses federal hunting regulations, but does not include information regarding the landowners' rights to forbid trespass on their lands.	We recommend that the FEIS provide additional explanation of the landowners' authorities, for example, to close their lands to trespass, post their lands and not allow hunting, except perhaps through permit systems as other Alaska Native Village Corporations have done. For example, see the Eklutna Village Corporation website for an example of how they limit access and enforce tresspass laws: https://www.eklutnainc.com/corporate-lands/	
3.9 Subsistence	3.9 -1 . Subsistence Use Areas map	3.9-9	The map of overlapping subsistence areas shows that the proposed mine site is located within the most highly used subsistence area for all 12 communities in the EIS analysis area. We are concerned that this subsistence area has high regional value to communities.The PFEIS does not discuss the implications of loss of access to this popular subsistence harvest area, nor does it discuss which resources specifically will be impacted. The TEK section says that, in addition to wild game, "Over 80 edible and medicinal plants grow and are harvested in the project area, including several species of berries, wild peas, wild onions, ferns, cow parsnip, rosehips, and many others."	We recommend that the FEIS discuss the regional value of the subsistence harvest area where the proposed mine site will be located. We recommend that the FEIS also address potential impacts from loss of access for traditional harvesting and subsistence hunting at the mine site. See our comments below on Chapter 4.9 for more details.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
3.9 and 4.9 Subsistence	3.9.3		Freshwater Seals. The community consumption charts show that seal is an important component of the traditional diet in the region. However, the importance of seal to the diet is not discussed in depth.	We recommend expanding the discussion of seal harvest to better understand the sharing networks for freshwater seals throughout the region.	
4.9 Subsistence	Chapter 4.9	General to discussions of changes to resource availability and access	This chapter discusses impacts to subsistence in terms of population level decreases, but does not address fully changing access to key places. An important element of subsistence is place. Not all places are accessible, allowing access by harvesters. Typically, an area is important because of a unique combination of accessibility, available resources and distance from the community. If the resource population is essentially unimpacted, but the harvesters can no longer go to where they are available, the subsistence opportunity is effectively reduced. The proposed mine site, shown on figure 3.9.1, is an important subsistence use area.	We recommend that the FEIS clarify whether and where alternate harvest locations for impacted communities may be, acknowledging distance, terrain, and other factors. We understand that the State of Alaska will be providing recent technical papers to the Corps to support this analysis.	
4.9 Subsistence	4.9	4.9-1	The introduction to Section 4.9 lists the potential impacts that are evaluated. Potential impacts due to actual and perceived contamination are partially addressed in 4.9 subsections.	We recommend adding "changes in subsistence harvest resource quality" to the list of potential impacts and evaluating this impact (throughout Chapter 4.9) for all alternatives.	
4.9 Subsistence	4.9.3	4.9-4 & 4.9-5	The document identifies the issue of subsistence harvesters avoiding birds because of contamination concerns. We note that this could extend to avoidance of harvesting berries and other plants along the transportation corridor as well.	We recommend that section 4.9 of the FEIS address (possibly by referencing other sections of the document where this information can be found): 1) How potential contamination of subsistence resources will be included in the PLP draft monitoring plans; 2) How changes in consumption due to these concerns will be monitored; 3) How traditional foods will be monitored to ensure that there is no bioaccumulation of contaminants.	
4.9 Subsistence	4.9.3.1	4.9-5	The last paragraph says that the area is used by five communities, and is not in an area with high overlap for subsistence uses. This may conflict with the map provided, figure 3.9.1, which shows the mine site as an important site used by all 12 communities.	We recommend clarifying statements regarding the use of the project area and providing a reference to Figure 3.9.1.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
4.9 Subsistence	4.9.3.3	4.9-10	Competition between communities for resources could be expected to increase since some harvesters will be displaced from their traditional use areas. Competition is referenced in this section, but does not include competition due to lack of access to traditional use areas, instead the focus is on Illiamna area's increased population.	We recommend adding a paragraph discussing increased regional competition for resources due to displacement from traditional use areas to the FEIS.	
4.9 Subsistence	4.9.7	4.9-24	Table 4.9-2. The discussion of cumulative impacts does not include potential contamination of subsistence resources. This topic is refenced in discussion of the open pit lake, and is discussed as a potential impact for the proposed project.	We recommend adding a discussion of the potential impacts to quality of subsistence foods to Section 4.9 in the FEIS. We recommend that this is a reasonable and relevant impact given the expanded mine scenario that has a longer life and extent.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Chapter 2 Alternatives & Appendix D Comment Analysis Report	2.2.4.1 and Table D-1	2-19 and D-275	The PFEIS contains conflicting information about the criteria that would be used to define PAG & NPAG and ML & non-ML rock. The response to the SOC regarding this issue states that an NP/AP ratio of 1.4 will be used to distinguish PAG from non-PAG and that the criteria to segregate ML from non-ML waste rock are included in the EIS (pg. D-275). However, the EIS states that the State of Alaska will determine the final NP/AP ratio and no mention is made of the ML & non-ML criteria in the EIS (pg. 2-19).	We recommend that FEIS sections related to this issue consistently describe the current criteria that is proposed (for both PAG and ML materials) and also that the State of Alaska will make the final decision.	
Chapter 2 Alternatives	2.2.4.1	2-16	Regarding: "This water would be primarily collected from perimeter wells, and either stored for mill start-up…"	EPA recommends clarifying in the FEIS where pre-production dewatering water would be stored, since the text is unclear as to the scheduling of mine dewatering and construction of any water storage ponds.	
Chapter 2 Alternatives	2.2.4.1	2-21	Regarding: "Surface runoff from the quarries is assumed to be non-contact water that can be collected and treated in sediment ponds before being released to the environment."	EPA recommends that the Corps clarify that these quarries may be considered gravel pits by the State and subject to State stormwater permits. We recommend that the EIS note that the applicant should contact the State to determine if the quarries are subject to stormwater permits and that any required conditions of an applicable State permit would be applied to this action.	
Chapter 2 Alternatives	2.2.4.1 Mine Site - Tailings Storage Facilities and Main Water Management Pond	2-22	Regarding: "Maintaining the pyritic tails and PAG waste in a sub-aqueous state to prevent oxidation." Complete anoxic and reducing conditions are required to prevent oxidation, and some oxidation reactions occur even in sub-oxic environments. Oxidation can occur by oxygen, microorganisms, and ions that oxidize others to then become reduced (e.g., microbial nitrate reduction coupled with oxidation of pyrite).	We recommend substituting "minimize" for "prevent" throughout the FEIS, since it is unlikely that oxidation can be completely prevented, but it can be minimized.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Chapter 2 Alternatives	2.2.4.1 and Table D-1	2-48 and D-19	The discussion of financial assurance for reclamation and closure has been updated in the PFEIS, but an estimate of the financial assurance amount that would be required to accomplish closure and long-term water treatment has not been provided. The response to our DEIS comment/SOC on this topic is that the EIS assumes that State financial assurance requirements would be complied with.	Thank you for addressing our comment in the Draft EIS regarding including financial assurance for reclamation and closure activies. Based on examples in other mining EISs, the Corps may wish to provide additional measures to strengthen the effectiveness of the financial assurances by confirming the reclamation and closure, including water treatment into perpetuity, would be adequately funded by providing an estimate (or range of estimates) of the amount of financial assurance that would be required.	
Chapter 2 Alternatives	2.2.4	2-78	Regarding: "Reject and/or WTP solids from the port site would either be trucked to the mine site for disposal in the pyritic TSF, or shipped off site to a disposal facility." We note that the PFEIS does not mention the possibiilty of off site disposal on the previous page, 2-77.	EPA recommends reconciling this statement with the one on page 2-77 that does not mention the possibility of off site disposal of the reject and/or WTP solids from the port site.	
Chapter 2 Alternatives	Section 2.2.4.3 and Figures 2-32 and 2-33	2-69 to 2-72	Preferred caisson dock design -- The narrative and figures do not clearly describe the new Port preferred alternative caisson dock design, especially in terms of causeway openings.	We recommend that the narrative in Section 2.2.4.3 be clarified, and a length-wise cross-section added to Figure 2-33, to better explain the preferred caisson dock design, especially related to openings in the structure. Openings will have a large effect on sediment nearshore transport, and we therefore recommend that they be as large as safety permits.	
Chapter 2 Alternatives	Section 2.2.5.7 and Figure 2-63, Section 2.2.6.6 and Figure 2-76		Piling Variants -- The narrative includes details such as 48" diameter piles and piling wall thickness, but does not include the piling type -- metal, concrete, etc. Also, no cross-sections are provided for the piling variants.	We recommend that the FEIS provide additional details on the piles to be used in both the Amakdedori and Diamond Point piling variants, as well as cross-sections as were provided for other alternatives. Depending on the piling types/materials used, the noise associated with the impact hammer placement method may change the degree of significance and/or intensity of the impact.	

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	
Chapter 2 Alternatives	2.2.7.5	2-146	Regarding: "If, during State permitting, it was confirmed to not be an allowable discharge, a water return pipeline to transport water removed from the concentrate slurry to the mine site for treatment would be proposed."	We appreciate that the text of the PFEIS acknowledges EPA comments on the Draft EIS regarding discharge of process wastewater under Alternative 3, and that the document includes a "Concentrate Pipeline Operations Variant Option with Return Water Pipeline" for Alternative 3. However, EPA continues to recommend that the Corps not include discharge of process wastewater as a part of Alternative 3 in the FEIS, because this discharge is not an allowable discharge under NPDES 40 CFR 440 Subparts J and L. The State of Alaska concurred on EPA's opinion regarding this (RFI-158). While we recognize this may be addressed later during the State permitting process, we do not recommend implying in the FEIS that this is a viable alternative. This issue is discussed in detail in our DEIS comments on Alternative 3 - Concentrate Pipeline Variant.	
Chapter 2 Alternatives	Footnote 15	2-146	Regarding footnote 15 citing "40 CFR Subpart J(b)"	EPA recommends using the correct citation to the regulations which is 40 CFR 440.104(b)(1)	
Appendix K-2 Alternatives	Section 4.18		Pile Supported Dock Variant -- While we agree that this variant will affect nearshore transport processes the least of the alternatives, the conclusion that the structure would be "transparent" is not supported.	In the absence of a coastal engineering study, we recommend that this statement be revised to state that a pile-supported structure will be the least impactful in terms of nearshore sediment processes, rather than "transparent." Pile-supported structures can still have some effects on sediment transport, which depend on size, pile spacing, environs, etc.	

From:	Foster, Maureen D
To:	Newman, Sheila M CIV USARMY CEPOA (USA); McCoy, Shane M CIV USARMY CEPOA (USA); POA Special Projects; elizabeth.bella@aecom.com
Cc:	Hambleton, Ryan M; Siekaniec, Greg E; Striker, Donald; Mills, Katie E; Wallace, George R
Subject:	[Non-DoD Source] Comments on Pebble Mine Project PEIS
Date:	Thursday, April 02, 2020 5:28:10 PM
Attachments:	Final Pebble FEIS Comment transmittal ltr signed 2020-04-02.pdf NPS-Comments-on-Pebble-PFEIS 2020-03-23.pdf FWS Pebble Mine PFEIS Comment Table 2020-03-23.pdf

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Attached are comments from the National Park Service and the U.S. Fish and Wildlife Service with a cover letter from Assistant Secretary for Fish and Wildlife and Parks.

Please let me know if you have any issues with this email.

Thank you.

_____

Maureen D. Foster
Chief of Staff
Office of the Assistant Secretary
for Fish and Wildlife and Parks
Udall Interior Building
1849 C Street, NW; Room 3161
Washington, DC 20240

202.208.5970 (desk)
202.306.3845 (mobile)
202.208.4416 (main)

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

April 2, 2020

Colonel Phillip Borders
U.S. Army Corps of Engineers, Alaska District
Attention: Regulatory Branch, Mr. Shane McCoy
Post Office Box 22270
Juneau, Alaska 99802-2270

Dear Colonel Borders:

Thank you for the opportunity to provide U.S. Fish and Wildlife Service (FWS) and National Park Service (NPS) cooperating agency comments on the Preliminary Final Environmental Impact Statement (PFEIS) for the Pebble Mine Project. We also appreciate the opportunities U.S. Army Corps of Engineers (USACE) has provided for consultation regarding FWS and NPS concerns, including several rounds of technical meetings, since the publication of the Draft EIS (DEIS) and the full 45-day agency comment period for the PFEIS.

The Department of the Interior (DOI) provided significant comments on the DEIS from the FWS and NPS, addressing these and other potentially impacted resources. In general, the PFEIS addresses DOI's previous comments and concerns. As cooperating agencies, the FWS and NPS have reviewed select chapters of the PFEIS and provide the enclosed comments to further assist the USACE.

The FWS and NPS appreciate the opportunity to participate as cooperating agencies for this project. If you have any questions about our comment and recommendations, please contact Acting NPS Regional Director Don Striker directly at 907-644-3502 or, for the FWS, Ecological Services Branch Chief, Mr. Douglass Cooper (907-271-1467 or douglass_cooper@fws.gov), or Fish and Wildlife Biologist, Ms. Catherine Yeargan, (907-271-2066 or catherine_yeargan@fws.gov) at the Anchorage Fish and Wildlife Conservation Office.

Sincerely,

Rob Wallace

Rob Wallace
Assistant Secretary
for Fish and Wildlife and Parks

Enclosures

Enclosure 1: U.S. Fish and Wildlife Service Comments and Recommendations for Inclusion in the Pebble Limited Partnership Statement and Management Plans					*Final Environmental Impact*
#	**Section or Chapter Name**	**Subsection, Figure, or Table Name**	**Page #**	**Comment/Issue**	**Recommendation/Action**
1	4.23 WILDLIFE	General Comment	4.23-1	Invasive species are mentioned here but referenced to the vegetation section.	We recommend that the discussion of relevant wildlife impacts from introduced invasive species be moved to this section.
2	4.24 FISH	General Comment	4.24-1	Marine and freshwater invasive species should be addressed in this section under potential impacts.	We recommend that the discussion of relevant fisheries impacts from introduced invasive species be moved to this section.
3	4.24 FISH	General Comment		The PFEIS takes the view that the elimination and degradation of salmon habitat will have incremental and linear (yet undetectable) effects on salmon populations, but collapses and extirpation of salmon populations from both coasts of the U.S. (and around the world) have shown that habitat loss and degradation from multiple sources can add up in ways that eventually lead to the demise of productive, self-sustaining salmon populations (*Nehlsen et al. 1991, Lichatowich 1999, Montgomery 2003*). The need for a thorough assessment of cumulative impacts from past, present, and reasonably foreseeable future actions is particularly acute given that the Nushagak and Kvichak watersheds are integral components of one of the world's few remaining wild-salmon-based ecosystems and major contributors to the world's largest remaining wild salmon runs. *Nehlsen, W., J.E. Williams, and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: Stocks at risk from California, Oregon, Idaho, and Washington. Fisheries 16:4-21; Lichatowich, J.A. 1999. Salmon without rivers: A history of the Pacific salmon crisis. Island Press, Washington, DC; Montgomery, D. 2003. King of fish: The thousand-year run of salmon. Westview Press, Cambridge, MA.* **Return to Excerpt**	We recommend the USACE conduct additional analysis to assess cumulative environmental impacts that could reasonably be expected to occur following development of the described mine plan, including full buildout of the Pebble Deposit and development of additional mining claims in the region that would become economically feasible if infrastructure for the proposed project were to be built (e.g., port facilities, road system, natural gas pipeline). The mine expansion scenario in Table 4.6-2 indicates expansion of the footprint into South Fork Koktuli River and Upper Talarik Creek watersheds but the PFEIS does not thoroughly describe the potential impacts to these water bodies, and potential impacts to Iliamna Lake via Upper Talarik Creek. Table 4.6-2 briefly describes impacts related to exploration at nearby mining claims; the PFEIS should evaluate the extent to which development of surrounding projects would be facilitated by Pebble's infrastructure and thoroughly describe the impacts of such development. We recommend that the analyses consider the cumulative impacts of these and other foreseeable actions.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
4	4.24 FISH	General Comment		The PFEIS fails to consider interactions between mine development and climate change on fish resources (i.e., the word 'climate' never appears in section 4.24 or 4.6). A large and growing body of research documents ongoing changes in aquatic habitats associated with global environmental change. For streams affected by the proposed mine, model projections through 2100 include greatly increased winter streamflow (including unprecedented high flow events), loss of high spring flows that typify the current hydrograph (due to decreasing winter snowpack), and increasing water temperature (*Wobus et al. 2015*). Since the PFEIS does not account for such changes in hydrologic and thermal regimes, it potentially understates the impacts to aquatic habitats and fish. For example, distributions of fish species and life stages will likely shift upstream within stream networks in response to climatic warming, creating a situation where actual patterns of habitat use no longer align with those assessed in the PFEIS. Additionally, the PFEIS estimates changes in the extent of suitable spawning and rearing habitats for various species and life stages based on mine-related changes in streamflow without regard for the potential that mine-related impacts could be exacerbated by environmental-related changes in streamflow. Additionally, changing environmental conditions and climate projections should be considered when designing road culverts to avoid velocity barriers from increased winter streamflow and changes in the timing of life history events should be considered when formulating timing	Because activities associated with the proposed project are expected to occur over an approximate 25-year period, the Service recommends including a discussion of predicted environmental changes over that timeframe and the additive impacts construction and operation of the proposed project could have on fish and their habitats. *Wobus, C., R. Prucha, D. Albert, C. Woll, M. Loinaz, and R. Jones. 2015. Hydrologic alterations from climate change inform assessments of ecological risk to Pacific salmon in Bristol Bay, Alaska. PLoS ONE 10(12).*

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
5	4.24 FISH	General Comment		The PFEIS fails to acknowledge that habitat destruction and degradation associated with mine development (and the related cumulative impacts from past, present, and reasonably foreseeable future actions) would erode the portfolio of habitat diversity and associated life history diversity that stabilize annual salmon returns to the Bristol Bay region (e.g., *Schindler et al. 2010, Brennan et al. 2019*). Considerable research, much of it focused on Bristol Bay salmon populations, has shown that areas of high salmon productivity shift through time and that habitat diversity maintains the resilience and productivity of salmon runs in the same way a diversity of stocks in an investment portfolio maintains the resilience and productivity of financial investments. *Schindler, D.E., R. Hilborn, B. Chasco, C.P. Boatright, T.P. Quinn, L.A. rogers, and M.S. Webster. 2010. Population diversity and the portfolio effect in an exploited species. Nature 465:609-613; Brennan, S.R., D.E. Schindler, T.J. Cline, T.E. Walsworth, G. Buck, and D.P. Fernandez. 2019. Shifting habitat mosaics and fish production across river basins. Science 364:783-786.*	Portfolio theory is an important and unifying concept in salmon biology and conservation. The PFEIS does not adequately discuss impacts of the proposed development (including the related cumulative impacts from past, present, and reasonably foreseeable future actions) in this context. We recommend the PFEIS analysis include this important aspect of salmon ecology, including: (1) that destruction and degradation of relatively small portions of habitat can have disproportionately large impacts on salmon runs in some years, (2) that estimates of the importance of a given salmon habitat in one time period may not truly reflect its long-term importance, and (3) that collapses of salmon runs in the Pacific Northwest (e.g., *Moore et al. 2010, Carlson et al. 2011*) and elsewhere have been linked to incremental degradation of habitat complexity and attendant erosion of salmon life history diversity. *Moore, J.W., M. McClure, L.A. Rogers, and D.E. Schindler. 2010. Synchronization and portfolio performance of threatened salmon. Conservation Letters 3:340-348; Carlson, S.M. and W.H. Satterthwaite. 2011. Weakened portfolio effect in a collapsed salmon population complex. Canadian Journal of Fisheries and Aquatic Sciences 68:1579-1589.*
6	4.25 T&E	4.25.4.6 Steller's Eider, Injury and Mortality	4.25.36	In the fourth paragraph under this sub-heading, please revise the sentence, "Injury or mortality to molting and wintering Steller's eiders is not anticipated during construction or the port and natural pipeline because construction would occur when Steller's eiders are absent." Wintering eiders begin showing up in the area in mid-August, and the construction phase of the project will continue into September, meaning a temporal overlap between construction and wintering eiders can be expected.	We recommend that this sentence be revised to indicate that wintering eiders will be in the area when construction activities are occurring, from mid-August to September.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
7	4.25 T&E	4.25.4.5 Northern Sea Otter, Behavioral Disturbance, Underwater and Airborne Noise	4.25-30	Please note, the volume and duration of sound from aircraft are likely to be different than referenced. Aircraft are stated to be the most significant source of airborne sounds for sea otters on p K-25-4, however the focus of effects of aircraft is on duration and levels of sound below the water's surface during flyovers at 1,000 feet. Aircraft sounds are greater above the water's surface and are higher during takeoff and landing than during a flyover (Newman and Rickley, 1979). Both Appendix K 4.25 and Section 4.25 state that proposed flights to and from the port would generally occur over 1,000 feet except during takeoff and landing. Given that: 1) the port location is close to the water, 2) the purpose of the airport is for takeoffs and landings, 3) the USFWS 2019 citation on p 4.25-30 used to support the notion that behavioral disturbance will be "minor" involved overflights at 1,000 feet, the case is not made that aircraft operations associated with the port will have only minor effects on sea otters.	Please review use of the USFWS 2019 citation and revise accordingly. Delete following from p 4.25-30 "Although masking of these crucial airborne calls is possible, the duration of sound from aircraft will be brief, and therefore unlikely to result in separation of females from pups (USFWS 2019). The magnitude and extent of impacts on sea otters from underwater and airborne noise generated during use of the airstrip at Amakdedori port during construction would be minor behavioral disturbance during aircraft approach or departure at lower altitudes."
8	4.25 T&E	4.25.4.5 Northern Sea Otter, Behavioral Disturbance, Underwater and Airborne Noise	4.25-30	The quoted received sound level at the water's surface during a helicopter overflight is incorrect. The altitude should read 1,000 feet, not 500 feet.	We recommend that you change to: "At the surface of the water, the received sound level from a helicopter flown at 1,000 feet is roughly 75 dB re 20 µPa"
9	4.25 T&E	4.25.2.1 Impacts Analysis	4.25-6	Discussion of MMPA authorizations appears to be primarily focused on the NMFS' process.	USFWS MMPA authorizations should be included in this section, as well.
10	4.25 T&E	4.25.2.1	4.25-6	MMPA definitions of Take by Level A or Level B harassment are based in behavior. Acoustic criteria for PTS and TTS have been developed by NMFS as a proxy for take. Although USFWS uses the NMFS acoustic guidelines for estimation of take attributable to activities that produce underwater noise, USFWS also uses behavioral criteria for take estimation.	We recommend that you add behavioral component to discussion of take on p 4.25-6.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
11	4.25 T&E	4.25.2.1 Impacts Analysis	4.25-6	The USFWS works with applicants to make modifications to project design and/or develop mitigation measures to minimize take associated with activities. In areas where sea otter densities are high, such as Kamishak Bay, it may not be possible for the USFWS to meet determinations necessary for authorization of Incidental Take under the MMPA. It is premature to discuss whether the submission of an application for Incidental Take Authorizations or Regulations under the MMPA will result in issuance of such an authorization.	Recommend revising lanugage in this section to better reflect the process for seeking incidental take under MMPA rather than conveying the assumption that incidental take will be granted.
12	4.25 T&E	4.25.4 Applicant's Preferred Alternative	4.25-8	"Tower lighting for nighttime conditions would include a steady burning red light at the top, in accordance with FAA guidelines…."	Please see the FAA's updated tower lighting guidance, found in the FAA's Advisory Circular 70/7460-1L; this updated guidance calls for new lighting and marking standards to reduce impacts on migratory bird populations. https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_70_7460-1L_-_Obstuction_Marking_and_Lighting_-_Change_2.pdf
13	4.26 VEGETATION	4.26.10 Invasive Species	4.26-31	Marine and terrestrial animals are addressed in the vegetation section.	We recommend that you analyze the marine and terrestrial animals within the wildlife and fisheries sections. Although terrestrial or aquatic plants may have indirect impacts on fish and wildlife, it is not appropriate to analyze animals in the vegetation section.
14	4.26 VEGETATION	4.26.10 Invasive Species	4.26-32	The documents states PLP has an invasive species management plan (ISMP); however, the plan that is included in RFI 133 is incomplete.	Currently, this plan only addresses plants. We recommend the ISMP be updated to address how the PLP will address invasive mammals or insects that may be introduced through barge and shipping traffic as well as marine species.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
15	4.26 VEGETATION	4.26.10 Invasive Species	4.26-33	There are many other marine species that are an introduction concern in the Gulf of Alaska and the Bering Sea - the two main shipping pathways for materials to and from the ports for this project. *Reimer et al. 2017* conducted an analysis of the amount of traffic and ballast being brought to ports in the Bering Sea of Alaska. They also provided a ranking of the species of concern for introduction from ballast and biofouling.	Please add discussion to the marine invasive species section discussing the pathways of introduction and provide greater detail on other marine invasive species that may be introduced through the proposed project. - https://accs.uaa.alaska.edu/invasive-species/bering-sea-marine-invasives/ - https://accs.uaa.alaska.edu/wp-content/uploads/Reimeretal2017_FinalReport.pdf
16	4.27 SPILL RISK	4.27.4.1 Fate and Behavior of Spilled Diesel	4.27-10	The text states microbial degradation of diesel "would be a slower process in cold climates," but the effects analysis would be enhanced by an indication of how much slower - would this be days/weeks/months?	We recommend that you revise to provide a more precise estimate for how much slower this process will be.
17	4.27 SPILL RISK	4.27.4.1 Fate and Behavior of Spilled Diesel	4.27-10	In the second paragraph, the following excerpt uses the information from the cited reference in a misleading way. "Over 90 percent of diesel from a small spill (less than 5,000 gallons) would evaporate or naturally disperse within hours to days of a spill; therefore, diesel from such small spills is generally not recoverable (NOAA 2018i)." Note - the citation link for this reference no longer works. A presumably very similar document was found at https://response.restoration.noaa.gov/sites/default/files/Small-Diesel-Spills.pdf. This newer reference specifies that greater than 90% evaporates/disperses IN WINDY CONDITIONS and a smaller amount evaporates/disperses in low wind conditions.	We recommend that you revise the sentence to: "In windy conditions, over 90 percent of diesel from a small spill (less than 5,000 gallons) would evaporate or naturally disperse within hours to days of a spill, while in low wind conditions, approximately 2/3 would disperse/evaporate after several days; therefore, diesel from such small spills is generally not recoverable (NOAA 2018i).
18	4.27 SPILL RISK	4.27.8.9 Tailings Release Scenarios, Spill Response	4.27-100	Cleanup opportunities seem to be limited to summer and winter. However, much of the year ice is partial, shallow, building, or breaking up.	Revise text to reflect advantages and disadvantages of all ice-states on spill and cleanup probabilities: open water, ice-up and break-up (broken ice), and ice-covered, and with or without under-ice open or flowing water.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
19	4.27 SPILL RISK	4.27.8.9 Tailings Release Scenarios, Potential Impacts of a Bulk Tailings Delivery Pipeline Rupture, Surface Water Quality, Metals	4.27-104	Thank you for providing details on the acidity of the NFK river. This information is important to analysis of all spill scenarios involving tailings, and should be provided in all other spill risk scenarios involving tailings.	Add this level of detail - actual measured data - to other Metals discussions throughout Section 4.27.
20	4.27 SPILL RISK	4.27.8.9 Tailings Release Scenarios, Potential Impacts of a Bulk Tailings Delivery Pipeline Rupture, Wetlands and Other Waters/Special Aquatic Sites, and Vegetation	4.27-107	Discussion of removal of spilled tailings and wetlands restoration is imprecise.	We recommend that you revise the last paragraph in this section to read, "In the spill response described for this scenario, the majority of spilled tailings would be removed and the duration of impacts could range from one to several growing seasons. If it is not possible to remove the majority of tailings, or if water with high metals concentrations elevates soil or sediment metals concentrations, the duration of impacts could range from a few growing seasons (for vegetation to grow on the tailings) to permanent (if wetlands are buried and not restored)."
21	4.27 SPILL RISK	4.27.8.9 Tailings Release Scenarios, Potential Impacts of a Bulk Tailings Delivery Pipeline Rupture, Wildlife	4.27-107	Water that is high in metals may impact wildlife forage by increasing metals concentrations in soils with subsequent uptake in forage.	We recommend that you revise the second paragraph to include this exposure pathway.
22	4.27 SPILL RISK	4.27.8.9 Tailings Release Scenarios, Potential Impacts of a Bulk Tailings Delivery Pipeline Rupture, Birds	4.27-109	Not mentioned are the potential long-term impacts to birds of ingesting spilled tailings during foraging, as has been demonstrated at other sites. The statement, "Birds that prey on species killed by ANFO and sodium ethyl xanthate...are unlikely to experience lethal toxicity" is incorrect. In fact, it is more likely that a bird will experience lethal toxicity if ingesting prey items that have died from toxicity in a concentrated manner, e.g., invertebrates and fish that were killed in a spill of toxic chemicals.	Please review Blus, Lawrence J., et al. "Lead toxicosis in tundra swans near a mining and smelting complex in northern Idaho." Archives of Environmental Contamination and Toxicology 21.4 (1991): 549-555. Incorporate the information here and in impacts analysis of tailings releases later in the section. Also, we recommend that you delete the referenced sentence on lethal toxicity, or provide justification for the conclusion made using peer-reviewed literature that evaluates the ecotoxicological exposure of birds preying on fish or invertebrate kills due to spills of toxic materials.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
23	4.27 SPILL RISK	4.27.4.2 Historical Data on Diesel Spills, Spill Frequency and Volume, Tanker Trucks	4.27-11	Term "toxin" is used incorrectly. A toxin is a biologically derived toxic substance (like snake venom). The materials of concern in this Chapter (oil and heavy metals) are "toxicants".	Please change "toxin" to "toxicant".
24	4.27 SPILL RISK	4.27.8.9 Tailings Release Scenarios, Potential Impacts of a Bulk Tailings Delivery Pipeline Rupture, Threatened and Endangered Species	4.27-111	Untreated contact water could have (as previously noted in this section) effects on prey resources, particularly salmon, for T&E species.	We recommend that you revise the text to reflect effects of T&E species prey, particularly salmon.
25	4.27 SPILL RISK	4.27.8.9 Tailings Release Scenarios, Potential Impacts of a Bulk Tailings Delivery Pipeline Rupture, Commercial and Recreational Fishing	4.27-112	Permanent impact to the salmon fishery is acknowledged here, and similar discussion of impacts should be represented in the sections on Wildlife, Birds, Threatened and Endangered Species and Marine Mammals (salmon as prey), Fish (salmon and those who prey on salmon), and Subsistence.	We recommend that you amend the previous sections to reflect the potential for a permanent reduction in the North Fork Koktuli river (NFK) salmon populations, as seen in Commercial and Recreational Fisheries sub-section.
26	4.27 SPILL RISK	4.27.4.2 Historical Data on Diesel Spills, Spill Frequency and Volume, Marine Tanker Vessels	4.27-12	The probability of a tug-barge spill of between 42,000 and 420,000 gallons was estimated based on records of incidents that occurred primarily outside of the project area, included all maritime activities (many of which were objectively less risky than the activities proposed in this PFEIS), and were not in locations precluded from assistance from emergency tugs. As such, the spill rate projections do not adequately address the risks associated with the potential development of the Amakdedori/Diamond Point Ports.	The Service recommends explicitly acknowledging that the probability of a 42,000-420,000 gallon spill associated with the proposed project may be higher than the values presented in this section of the PFEIS due to the inherently riskier activities that vessels would undertake.
27	4.27 SPILL RISK	4.27.4.3 Existing Response Capacity	4.27-13	Chadux may have equipment at the mine site, but would mobilize from hubs. The mobilization times to remote and inaccessible project areas are important, since minimization of effects from a diesel spill depends on timely cleanup and response. This is clearly stated under specific scenarios, but should be emphasized here.	We recommend that you revise to include a range of precise (to days) estimates of Chadux response times to different portions of the project area, or state if it is unknown (as on p. 4.27-26, Marine Barge Collision scenario, Spill Response Section).

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
28	4.27 SPILL RISK	4.27.8.9 Tailings Release Scenarios, Potential Impacts of a Pyritic Tailings South Embankment Release into the SFK, Threatened and Endangered Species	4.27-132	Untreated contact water could have (as previously noted in this section) effects on prey resources, particularly salmon, for T&E species.	We recommend that you revise the text to reflect effects of T&E species prey, particularly salmon.
29	4.27 SPILL RISK	4.27.4.4 Mitigation/Avoidance and Minimization, Design Features of Marine Tug-Barges	4.27-14	Spill plan should identify additional measures.	We recommend that the tug-barge carry emergency tow gear.
30	4.27 SPILL RISK	4.27.4.4 Mitigation/Avoidance and Minimization, Design Features of Iliamna Ferry	4.27-14	We appreciate the thought and analysis related to ferry design. Since many spills are the result of human error, more information on how ferry crews will be trained would be helpful.	Revise to provide additional information on relevant maritime certifications, types and content of training, and required years of experience on ice-breaking ferries, as appropriate.
31	4.27 SPILL RISK	4.27.9.9 Potential Impacts of Untreated Contact Water Release from the Main WMP, Noise	4.27-144	If soil excavation and vegetation restoration are required, there would be noise associated with these activities similar to what has been described for other spill scenarios.	Please amend this section to reflect the potential for noise.
32	4.27 SPILL RISK	4.27.9.9 Potential Impacts of Untreated Contact Water Release from the Main WMP, Wildlife	4.27-147	The analysis of toxicological impacts presented here is complete, uses citations, is consistent, and is a good example of the level and quality of analysis for an important project. The molybdenosis discussion will be of profound interest to subsistence users and wildlife managers downstream from the project area.	We recommend that you use this analysis for all other spill risk scenarios where wildlife may be impacted by elevated metals concentrations in soils, sediments, or vegetation. Include discussion of molybdenosis.
33	4.27 SPILL RISK	4.27.9.9 Potential Impacts of Untreated Contact Water Release from the Main WMP, Birds	4.27-147	Waterfowl can also be exposed to elevated metals including lead in sediments during foraging.	Please review and incorporate Blus, Lawrence J., et al. "Lead toxicosis in tundra swans near a mining and smelting complex in northern Idaho." Archives of Environmental Contamination and Toxicology 21.4 (1991): 549-555.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
34	4.27 SPILL RISK	4.27.9.9 Potential Impacts of Untreated Contact Water Release from the Main WMP, Fish	4.27-148	The second paragraph of this section describes WQCs as "overly conservative." The conservative nature of water quality criteria are designed to protect species whose sensitivities may not be adequately represented by standard laboratory organisms used in toxicity testing. Laboratory species are chosen based primarily on ability to be raised in quantities large enough to support the experimental designs (i.e., statistically valid n's) of standard laboratory toxicity tests. Water quality criteria are also conservative because in natural conditions, even if the same species were present as used in laboratory tests, the additional stresses of foraging, predator avoidance, and reproduction (among others) may cause additive effects that may not be evident during exposures in the relatively stress-free laboratory environment.	We recommend that you delete the word "overly" from the second sentence of this paragraph.
35	4.27 SPILL RISK	4.27.9.9 Potential Impacts of Untreated Contact Water Release from the Main WMP, Threatened and Endangered Species	4.27-149	Untreated contact water could have (as previously noted in this section) effects on prey resources, particularly salmon, for T&E species.	Please revise text to reflect effects of T&E species prey, particularly salmon.
36	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover	4.27-16	The first paragraph on this page estimates the probability of a 3,000 gal spill from trucks hauling one- and two-trailer loads (but it fails to explicitly mention that it is based on the one- and two-trailer scenario). The three-trailer scenario may have a higher probability of accidents due to the heavier, harder-to-manuver loads and will also have higher volumes in jeopardy of spilling during any one accident. The previous paragraph does mention: "Triple trailers setups may be at a higher risk of upset than single or double trailers." However, the first paragraph on page 4.27-16 does not estimate the probability of a 3,000 gal spill from the proposed three-trailer loads. A careless reader may be mislead to thinking that it does, given the wording of the first two paragraphs on this page.	We recommend that you reiterate and include in the text near the end of the first paragraph or in the second paragraph a statement/explanation that the probabilities described likely underestimate the probability of a 3,000 gal from the proposed three-trailer trucks. We further recommend that you analyze or otherwise account for the the additional mass and torque that may be generated by a third trailer during a rollover; address difficulties of trailering three trailers on curved sections of the proposed project roads under all alternatives; if using historical data to estimate probabilities of spills, compare the road widths, curvatures, and grades in addition to miles traveled to better characterize the risk of diesel tanker spills from tanker truck rollover.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
37	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Spill Response	4.27-17	The scenario relies, in part, on the truck driver not being injured by the accident that caused the spill, so that the driver can report the spill immediately and begin to implement spill control activities. If the truck accident is serious enough to crack an ISO container, it is likely that the driver would be injured as well, delaying spill response; there have been multiple tanker truck accidents and spills in Alaska that have resulted in driver injuries or fatalities.	We recommend that you revise the response actions in the scenario to exclude actions by the driver.
38	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Alternatives Analysis	4.27-17	Fails to mention the Alternatives 2 and 3 access road along the shoreline of the bay, which may provide a notable contribution to spill risk compared to the other Alternatives.	We recommend that you revise this section to acknowledge the shoreline access road in Alternatives 2 and 3 and that the road's curves and marine weather exposure may create additional hazards to travel.
39	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Water and Sediment Quality, Water Quality	4.27-18	The scenario only discussed ice-free and completely frozen stream conditions and failed to consider partially frozen scenarios or accidents that cause breaks in ice. We recommend that the scenario consider the possibility that a truck accident at a frozen stream crossing may break the ice and allow spilled diesel to travel downstream under ice, which would greatly complicate any response efforts and would prevent evaporation of the volatile components into the air. Similarly, spilled diesel could enter a partially frozen stream, such as during the transition seasons between the ice-free and completely frozen conditions. The evaluation claims that diesel spilled onto frozen streams “would pool up” on top of the ice and would be relatively easy to remove; however, streams do not always freeze completely, making this assumption inaccurate. We appreciate the sentence in the general tanker truck spill scenario description that states: "In areas where ice is inconsistent, thin, or fractured, diesel could enter flowing water." However, the implications of diesel entering water bodies through broken ice or incomplete freezing of the water body should also be mentioned as part of the impact analyses.	We recommend that you revise the text to explicitly mention situations of broken ice or incompletely frozen water bodies and how diesel trapped under ice would affect recovery efforts and impacts.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
40	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Air	4.27-19	The conclusion that Air Quality would return to pre-burn conditions "relatively quickly" (BOEM 2012) is vague.	Please revise to define the term "relatively quickly".
41	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Wetlands and Other Waters/Special Aquatic Sites, and Vegetation	4.27-20	The sentence, "It is possible that evergreen trees and shrubs like Labrador tea would be less sensitive to diesel due to their waxy coatings," is unsupported.	Please revise to support with a reference, or remove the sentence.
42	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Wetlands and Other Waters/Special Aquatic Sites, and Vegetation	4.27-20	The PFEIS states: "Approximately 13 percent of the road corridor passes through wetlands or waterbodies, while the remainder is uplands." Is 13 percent true of all of the Alternatives?	Please revise to acknowledge the range of percentages, if they are different among Alternatives.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
43	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Wildlife, 3rd full paragraph	4.27-21	The PFEIS states: "Any species in the immediate vicinity may experience acute toxicity, especially if freshwater vegetation becomes covered in diesel." The analysis seems to suggest that acute toxicity in moose, beavers, and river otter from diesel spills relies on the oiling of freshwater vegetation, and the analysis does not mention the more likely toxic impacts (to at least beavers and river otter) from the ingestion of oil from self-grooming and the potential for hypothermia if their fur is oiled. These animals rely on the integrity of their fur for warmth in cold aquatic environments, and diesel sheens on water can easily contaminate fur, creating risks of hypothermia and/or dermal absorption. Oiled fur also poses an ingestion risk as the animals try to groom the diesel out of their fur. Much is known about the effects of oil spills on sea otters, and this information would be largely relevant to beaver and river otter despite differences in marine and freshwater environments and differences in diesel and heavier oils.	We recommend that you provide additional explanation on how toxicity would rely on oiled freshwater vegetation. Revise to acknowledge the risk of ingestion toxicity and hypothermia.
44	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Wildlife, 3rd full paragraph	4.27-21	Wood frogs breeding in wetlands are not mentioned as potentially impacted species, "if a spill occurs adjacent to a lake, stream, marsh, or other waterbody during summer months." Also, wood frogs are not likely to readily leave their breeding wetlands before being exposed to spilled diesel.	We recommend that you add wood frogs to the list of potentially impacted wildlife species in this spill scenario. Recognize that wood frogs are not likely to leave their breeding wetland due to the presence of the diesel spill or the presence of response activities; thus, wood frogs would experience a higher exposure probability than would the other wildlife species listed.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
45	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Wildlife, 4th full paragraph	4.27-21	It is incorrect to say, "Spills that occur during winter months are less likely to impact wildlife species, because many species are hibernating, or have reduced levels of activity and movement." In contrast, the previous paragraph suggested that potential impacts to wildlife during a spill during the summer would be lessened by the fact that, "Most terrestrial wildlife is anticipated to vacate the area during the spill and cleanup activities." Animals that are hibernating in the area of the spill are less likely to move out of a spill area in time to avoid exposure.	We recommend that you revise sentence to: "Spills that occur during winter months are less likely to impact wildlife species, because frozen substrates permit more efficient spill response and cleanup and limit the spread of diesel."
46	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Birds	4.27-22	Does not mention inhalation as an exposure pathway for birds.	We recommend that you include inhalation toxicity as an exposure pathway for birds, particularly for molting birds and nestlings that are confined to nests and cannot actively escape toxic air.
47	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Alternative 2 and Alternative 3—Diamond Point Port	4.27-22	The location of this section in the document seems to be out of place. Since this section mentions marine mammals, it is not a section meant as an extension of the Birds section immediately preceding. However, it also is not a complete discussion of the scenario impacts under Alternatives 2 and 3, since it only mentions marine mammals and birds, not all of the other natural resources discussed in the tanker truck scenario.	Please move this section to the end of the Tanker Truck scenario discussion (before the tug-barge scenario) and expand to address all of the other natural resources (e.g., fish, wildlife, etc.).

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
48	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Alternative 2 and Alternative 3—Diamond Point Port	4.27-23	The last phrase in the following sentence is unnecessary and misleading: "Impacts from diesel in the marine environment are discussed in detail below, a scenario where impacts would be reduced due to the smaller spill volume." In addition, it is not sufficient that the reader is sent to the tug-barge scenario to learn about the potential impacts to marine birds from a tanker truck accident that spills 3,000 gal directly into the marine environment. The reader is lead to believe the impacts from the tanker truck scenario would be less than the tug-barge scenario but is given no further information from which to gauge the magnitude of the potential impacts from the tanker truck scenario. A truck spill could affect relatively large numbers of rock sandpipers overwintering in the area and many other coastal/marine bird species likely present during the summer and migratory seasons.	We recommend that you delete the misleading phrase and revise sentence to: "Impacts from diesel in the marine environment are discussed in detail below in the marine tug-barge allision scenario; however, a 3,000 gallon diesel spill from from a tanker truck accident may not generate the same magnitude of impacts to natural resources as is described under the tug-barge scenario due to the smaller spill volume of the truck accident." Please add information that allows readers to gauge the risk to birds from a 3,000 gallon spill into the marine environment, such as "A discharge of 3,000 gallons of diesel into the nearshore marine environment could affect relatively large numbers of rock sandpipers overwintering in the area and many other coastal/marine bird species likely present during the summer and migratory seasons."
49	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Fish	4.27-23	The PFEIS Spill Risk section (4.27) does not describe the toxicity characteristics of diesel to fish. From NOAA: "Diesel is one of the most acutely toxic oil types. Fish and invertebrates that come in direct contact with naturally dispersed and entrained diesel in the water column may be killed. However, small spills in open water are so rapidly diluted that fish kills have never been reported. Fish kills have been reported for small spills in confined, shallow water and in streams, where weathering and mixing are reduced. Fish and invertebrates in small streams can be affected for miles downstream of a diesel release." (https://response.restoration.noaa.gov/sites/default/files/Small-Diesel-Spills.pdf)	We recommend that you include description of the relatively high toxicity of diesel to fish and other aquatic organisms.
50	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Fish	4.27-23	This section states: "Most adult and juvenile fish exposed to a diesel spill are mobile, and generally capable of limiting exposures until concentrations attenuate." This statement overstates the available scientific literature. Considering the fish species mentioned in Section 3.24 Fish Values, only some of the salmonids have been shown in the laboratory to have the ability to avoid oil concentrations in water.	We recommend that you revise sentence and acknowledge that, of the fish species likely to be present in the water bodies affected by the tanker truck 3,000 gallon spill scenario, laboratory studies have shown that some salmon species have the ability to detect and avoid concentrations of oil constituents in water when non-contaminated water is available.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
51	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Fish	4.27-23	This section states: "Depending on the location, a spill occurring between mid-May and June could have impacts on out-migrating juvenile salmon species." Without additional detail, this seems contradictory to the preceding statement ("Most adult and juvenile fish exposed to a diesel spill are mobile, and generally capable of limiting exposures until concentrations attenuate.").	Please provide more detail on ways out-migrating juvenile salmon fish are more susceptible to diesel toxicity than other fish in the impacted water body; revise paragraph to remove contradictory language.
52	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Threatened and Endangered Species	4.27-23	This section downplays the potential impacts to marine T&E species. The assessment that an accident along the 3-mile stretch of Diamond Point access road is "highly unlikely" is unsubstantiated. While it is true that this stretch of road is a small portion of the overall route, it is possible that the risk of an accident along these 3 miles (curvy, with little to no shoulder, and exposed to wind and weather from offshore) is greater than the risk of an accident along the rest of the travel route. The elevation of the road above the rocky marine shoreline may increase the likelihood that damage to a tank could occur if a truck slides off the road. A tanker truck sliding off the curvy road into the marine environment may be damaged in such a way that all 3,000 of the gallons spilled (or much more) could be released to the environment. The PFEIS also states without adequate support that "there is a potential for a small amount of ULSD to reach the marine environment." We discussed above how there is a potential for much more than a "small amount" to be released if an accident does occur. During the time it takes for diesel to mostly disperse and evaporate, significant harm could be done to marine T&E species if they are in the area.	We recommend that you revise this section to better assess the potential risks and impacts to marine T&E species.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
53	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Needs and Welfare of the People– Socioeconomics	4.27-23	The PFEIS states there will be no additional benefit to socioeconomics from a 3,000 gallon tanker truck spill, but there is no mention of potential negative impacts on socioeconomics.	We recommend that you include a description of the potential negative impacts on socioeconomics, or if there will be none, state so. An option is to use the language that is included with other spill scenarios: "Over the longer term, the impacts on employment, income, and sales would be negative if commercial and recreational fishing and/or tourism were to suffer due to the real or perceived impacts of the spill. Real or perceived water contamination could also negatively impact local business and consumers."
54	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Subsistence	4.27-24	The following statements seem contradictory: "A diesel spill resulting from a tanker truck rollover could have impacts on subsistence. The effects would be localized and temporary because fuel would evaporate, become diluted, and be cleaned up. A tanker truck release would not have effects on subsistence resources, although animals and subsistence users may temporarily avoid the area of the spill."	We recommend that you revise to address specific ways subsistence users and subsistence resources may be impacted, and provided additional detail on temporal impacts to subsistence.
55	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Tanker Truck Rollover, Potential Impacts of a Diesel Spill from Tanker Truck Rollover, Subsistence	4.27-24	Clear and timely communication with communities is as important for easing concerns as quick response and cleanup. By committing to the ICS system for emergency management, the PLP is committing to either a Local On-Scene Coordinator or a Liaison position in the Command and General Staff. These positions would help to connect local communities to the spill response.	Recommend changing the last sentence in subsistence paragraph to read, "Quick response and cleanup of the spill, as well as clear and timely communication with nearby communities, would help ease concerns about contamination for subsistence users in nearby communities."
56	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision	4.27-25	Use of the word "allision", found several times in the scenario description, is not plain-language.	Recommend changing this word to "collision" throughout the document.
57	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision	4.27-25	"The outer hull of the double-hulled barges would likely protect the fuel compartments from damage…" is imprecise.	We recommend that you revise this sentence to say, "The outer hull of the double-hulled barges is designed to protect the fuel compartments from damage…"

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
58	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision	4.27-25	The PFEIS states: "Kamishak Bay may have a different spill risk due to local conditions and different vessel traffic patterns." This is unnecessarily vague.	We recommend that you revise to reduce ambiguity, such as: "Kamishak Bay may have a higher spill risk due to local conditions (that may be relatively more hazardous) and different vessel traffic patterns, but lack of available data preclude estimates of how much higher." Alternatively, if information exists that would suggest the risk in Kamishak Bay is lower, state so here.
59	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision	4.27-25	The choice of a high-volume/low-probability spill as the spill risk scenario is beneficial to providing information on the risks/potential impacts of a large spill. However, the impacts from a smaller-volume/higher-probability spill should still be described to give the reader context on the potential impacts more likely to occur. Otherwise, the reader may be mislead to believe that smaller spills are significantly less environmentally harmful, even though the EIS process already has information that indicates otherwise.	Please add to the end of the 4th paragraph: "It is worth noting that spill trajectory modeling depicted in Owl Ridge (2018c) indicates that even a small spill (500 gallons) originating from near Augustine Island could have a significant portion (38 percent) travel more than 55 miles within 3 days to reach shorelines at Afognak Island."
60	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Air Quality	4.27-28	The conclusion that Air Quality would return to pre-burn conditions "relatively quickly" (BOEM 2012) is vague.	We recommend that you revise to define the term "relatively quickly".
61	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Wetlands and Other Waters/Special Aquatic Sites, and Vegetation	4.27-28	The PFEIS recognizes the potential for contamination of sediments in mudflats in nearby protected bays; however, there is no description of the resulting impacts. The section on Water and Sediment Quality is not relevant to intertidal mudflats, where stranded diesel may percolate into the sediments, perhaps facilitated by burrows of various benthic invertebrates.	We recommend that you revise to include a description of impacts to intertidal mudflats.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
62	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Wildlife	4.27-29	The PFEIS states that marine invertebrates that have ingested diesel "may be consumed by terrestrial mammals foraging along the shore, but are not likely to cause mortality to species that consume them." This is a misleading statement. Wildlife may eat marine invertebrates that have been surficially coated in diesel, and these wildlife may indeed experience toxicity from ingestion of toxic components of diesel (e.g., naphthalene). There is no evidence in the scientific literature that wildlife avoid eating oiled carrion or prey. Correcting this misleading statement here will make this section consistent with the next section (Alternative 2 and Alternative 3—Diamond Point Port), which states: "Impacts to terrestrial wildlife may occur if species are foraging along the shore or consume oiled prey."	We recommend that you revise the text to acknowledge that terrestrial wildlife that ingest diesel, whether it be through eating oiled prey, grooming, or through other incidental ingestion, can suffer toxic effects.
63	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Wildlife	4.27-29	Bivalves, including many of the normal prey of shoreline-traveling terrestrial wildlife, do not metabolize polycyclic aromatic hyrdrocarbons (PAHs), which are some of the more toxic constituents of petroleum products such as diesel. Bivalves not killed by a spill would undoubtedly have higher than normal concentrations of PAHs in them, and continue to expose wildlife that ate them to PAHs long after the spill was cleaned up. This is clearly discussed under Threatened and Endangered Species, Steller's Eider, and should also be discussed in the wildlife section.	Please revise the wildlife section to include discussion of bivalve accumulation of PAHs and the increased duration of exposure for wildlife who consume them.
64	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Wildlife	4.27-29	The only specific effect discussed is mortality. Exposure to diesel, whether through ingestion, inhalation, or dermal contact can have a variety of toxic effects on mammalian organisms, particularly those with fur who are dermally exposed.	Please revise to note the wide range of effects that mammals can have when exposed to diesel, through inhalation, ingestion, and dermal contact, similar to the discussion in the Marine Mammals section of this scenario.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
65	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Wildlife, Alternative 2 and Alternative 3—Diamond Point Port	4.27-29	The following information is mentioned in a section regarding Alternatives 2 and 3, but it is relevant for all Alternatives. "Following the Exxon Valdez oil spill, biologists observed brown bears in Katmai National Park feeding on oiled bird carcasses and intertidal invertebrates on oiled beaches (Lewis 1993). Based on a subsequent study of bears in the region, one yearling bear was found dead with high concentrations of naphthalene and phenanthrene, and several other bears showed exposure to crude oil. However, survival of the bears for the first 2 years following the spill was not greatly affected, and the significance of exposure did not appear to be great in the bear population (Lewis 1993). Other species, such as river otters, were also affected, with fewer otters in oiled areas; and they appeared to be less healthy. Some river otters died directly from oil coating or toxic crude oil fumes (Lewis 1993). Therefore, terrestrial wildlife has a potential to be impacted both directly (through inhalation and coating in ULSD) and indirectly (through consuming oiled prey) with varied impacts depending on the species impacted."	We recommend that you move/add the quoted text within the Wildlife section so that it is obvious to the reader that it applies to all Alternatives.
66	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Fish	4.27-34	The statement that shellfish lack enzymes to process and break down ingested contaminants is incorrect. More correctly, bivalves are unable to metabolize polycyclic aromatic hyrdrocarbons (PAHs), which are toxic components of oil.	We recommend that you revise the wildlife section to include discussion of bivalve accumulation of PAHs and the increased duration of exposure for fish who consume them.
67	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Fish	4.27-34	Impacts and exposure may last much longer than 30 days if significant mortality, contamination of prey, or entrainment in sediments occurs.	We recommend that you revise the estimated duration of the impacts.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
68	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Threatened and Endangered Species, Northern Sea Otter	4.27-37	The statement that "the duration of direct impacts would be short (10 to 20 days)" is not supported.	We recommend that you revise sentence to: "It is estimated that spilled diesel would be available in the environment for 10 to 20 days, during which time sea otters may be directly exposed to spilled diesel." Add to end of paragraph: "A 300,000-gallon spill in an area with high sea otter use (e.g., Kamishak Bay) could kill a significant number of sea otters, and this acute loss within the local population could be felt for several years due to the demographic lag hindering recovery (Esler et al. 2018)." Citation: Esler, D.T, B.E. Ballachey, C. Matkin, D. Cushing, R. Kaler, J. Bodkin, D. Monson, G. Esslinger, and K. Kloecker. 2018. Timelines and mechanisms of wildlife population recovery following the Exxon Valdez oil spill. Deep-Sea Research Part II 147:36-42.
69	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Threatened and Endangered Species, Northern Sea Otter	4.27-37	Bivalves, including many of the normal prey of northern sea otters, do not metabolize polycyclic aromatic hyrdrocarbons (PAHs), which are some of the more toxic constituents of petroleum products such as diesel. Bivalves that were not killed by the spill would undoubtedly have higher than normal concentrations of PAHs in them, and continue to expose wildlife that ate them to PAHs long after a spill was cleaned up.	We recommend that you revise this section to include discussion of bivalve accumulation of PAHs and the increased duration of exposure for wildlife who consume them.
70	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Threatened and Endangered Species, Steller's eider	4.27-38	The last sentence in the paragraph immediately preceding the paragraph beginning with "In summary," is out of place, as the paragraph which it ends is discussing impacts to Steller's eiders, not the duration of the spill.	We recommend that you remove the sentence, "The extent and duration of the diesel spill would be directly related to ocean current, time of year, and effectiveness of diesel cleanup."

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
71	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Spill from Marine Tug-Barge Allision, Potential Impacts of a Diesel Spill from Marine Tug-Barge Allision, Subsistence	4.27-40	Clear and timely communication with communities is as important in easing concerns as quick response and cleanup. By committing to the ICS system for emergency management, the PLP is committing to either an Local On-Scene Coordinator or a Liaison position in the Command and General Staff. These positions would help to connect local communities to the spill response.	We recommend that you change last sentence in subsistence paragraph to read, "Quick response and cleanup of the spill, as well as clear and timely communication with nearby communities, would help ease concerns about contamination for subsistence users in nearby communities."
72	4.27 SPILL RISK	4.27.4.5 Diesel Spill Scenarios, Scenario: Diesel Tank Farm Spill	4.27-41	Leaking tank valves have resulted in large spill volumes in Alaska. All scenarios could result in small or large amounts of spilled diesel, with the exception of a tank rupture (e.g., due to an earthquake) which would result in release of the entire tank contents and potential disruption of secondary containment as well. The potential for earthquake damage to pipelines in the next section also exists for tank farms.	We recommend that you revise this section to reflect the range of spill volumes from each type of scenario; include earthquake with the potential to release much of the volume out of tank farm tanks and outside of secondary containment.
73	4.27 SPILL RISK	4.27.3.1 Spill Preparedness Measures	4.27-5	This section lists the actions the Applicant has committed to perform/implement, such as staging spill response equipment, kits for wildlife hazing and bird/otter capture, and otter pens at Amakdedori Port and other important areas for the Alternatives other than Alternatives 2 and 3. Such equipment is not listed as being staged at Diamond Point port, which means that the potential environmental risks and impacts from spills are greater under Alternatives 2 and 3 compared to the other alternatives, due to reduced response capacity. This difference in potential impacts is not recognized in the PFEIS.	In Sections (a) Scenario: Diesel Spill from Tanker Truck Rollover, Alternatives Analysis, and (b) Scenario: Diesel Spill from Marine Tug-Barge Allision, Alternatives Analysis, we recommend that you recognize the relative increased risk and potential increased impacts of Alternatives 2 and 3 due to the lack of staged response equipment at Diamond Point port and other areas relevant to Alternatives 2 and 3.
74	4.27 SPILL RISK	4.27.6.4 Historical Data on Concentrate Spills, Trucking	4.27-51	Although it is true most Red Dog road spills have been reported as impacting land only and thus these spills are easier to clean up than spills impacting water, the Red Dog road crosses far fewer waterbodies, and these are not steep-gradient streams. Waterbody crossings on the proposed PLP network include several fast-flowing streams, in which the PEIS analyses state that concentrate and slurry spills would be difficult to clean up.	We recommend that you revise the text to include differences in the number, type, and gradient of water-body crossing between Red Dog road and the proposed PLP roads.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
75	4.27 SPILL RISK	4.27.6.5 Existing Response Capacity	4.27-52	This section should identify key points that would need to be addressed in PLP's spill response plans for ore concentrate.	We recommend that you revise the text to include key elements of an ore concentrate spill response plan.
76	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover	4.27-54 4.27-55	The third paragraph of this section estimates the probability of a concentrate spill from Red Dog trucks, which have two-trailer loads. The three-trailer scenario may have a higher probability of accidents due to the heavier, harder-to-manuver loads and will also have higher volumes in jeopardy of spilling during any one accident. Section 4.27.6.4 (Historical data on Concentrate Spills/Spill Frequency and Volume) has one sentence indicating that three-trailer loads may have a higher risk accident risk compared to two-trailer loads, but neither the scenario nor the description of historical data specifically alter the probability of truck-trailer accidents based on significant differences between the proposed roads and loads at the proposed mine and those at Red Dog.	We recommend that you reiterate and include in the text near the end of the first paragraph or in the second paragraph a statement/explanation that the probabilities described likely underestimate the probability of an ore concentrate spill from the proposed three-trailer trucks. We further recommend that you analyze or otherwise account for the the additional mass and torque that may be generated by a third trailer during an accident; address difficulties of trailering three trailers on curved sections of the proposed project roads under all alternatives; if using historical data to estimate probabilities of spills, compare the road widths, curvatures, and grades in addition to miles traveled to better characterize the risk of ore concentrate spills from a trucking accident.
77	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover, Spill Response	4.27-55	The scenario relies, in part, on the truck driver not being injured by the accident that caused the spill, so that the driver can report the spill immediately and begin to implement spill control activities. If the truck accident is serious enough to crack an ISO container, it is likely that the driver would be injured as well, delaying spill response. Multiple tanker truck accidents resulting in spills in Alaska have had driver injuries or fatalities.	Please revise the response actions in the scenario to exclude actions by the driver.
78	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover, Potential Impacts of a Concentrate Spill from a Truck Rollover, Water and Sediment Quality, TSS and Turbidity	4.27-57	In other sections, the PEIS states, "The recovery of concentrate spilled into a stream would be difficult to impossible, …." (p. 4.27-55), and, for high-energy streams, "By the time crews could mobilize for a response, much of the material would likely be dispersed downstream, making recovery impossible/impractical." (p. 4.27-56). If a concentrate spill cannot be recovered from a stream, the impacts listed should be based on all or most of the ore concentrate remaining in the stream.	Please delete the sentence, "If spilled concentrate is recovered promptly, the duration of the TSS and turbidity would likely last for a few days," and discuss the number of dry or very low-volume streams that are crossed by each proposed road.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
79	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover, Potential Impacts of a Concentrate Spill from a Truck Rollover, Water and Sediment Quality, Metals Leaching	4.27-58	In other sections, the PEIS states, "The recovery of concentrate spilled into a stream would be difficult to impossible, …." (p. 4.27-55), and, for high-energy streams, "By the time crews could mobilize for a response, much of the material would likely be dispersed downstream, making recovery impossible/impractical." (p. 4.27-56). If a concentrate spill cannot be recovered from a stream, the impacts listed should be based on all or most of the ore concentrate remaining in the stream.	We recommend that you revise this section to be consistent with discussion of recovery of concentrate in streams, especially fast-flowing streams. For example, revise the sentence beginning the second paragraph on p. 4.27-58 to read, "If a spill enters flowing water, most of the concentrate would be dispersed downstream." and delete the rest of that paragraph.
80	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover, Potential Impacts of a Concentrate Spill from a Truck Rollover, Water and Sediment Quality, Wetlands and other Waters/Special Aquatic Sites, and Vegetation	4.27-59	The scenario fails to address partially frozen waters or a spill that breaks the ice and results in ore concentrate beneath ice.	We recommend that you revise text to explicitly mention situations of broken ice or incompletely frozen water bodies and how ore concentrate trapped under ice would affect recovery efforts and impacts.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
81	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover, Potential Impacts of a Concentrate Spill from a Truck Rollover, Water and Sediment Quality, Wetlands and other Waters/Special Aquatic Sites, and Vegetation	4.27-59	The sentence, "This is because winter spills are easier to clean up," is not always true, and is specifically not true as an explanation for why spills in open-water season will affect a larger area than winter spills. It also negates the possibility of under-ice movement of ore concentrate. Similarly, the sentence "Spills that occur during the winter would have less impact and recovery would be faster," is again, not always true, for many of the reasons that we have already stated (e.g., under-ice water flow; broken ice conditions may occur during winter).	Please delete the referenced sentences, or revise them to acknowledge the advantages and disadvantages of all ice-states: open water, ice-up and break-up (broken ice), and ice-covered, with or without unde-ice open or flowing water on spill and cleanup probabilities.
82	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover, Potential Impacts of a Concentrate Spill from a Truck Rollover, Water and Sediment Quality, Fish	4.27-61	The last paragraph on this page states that over time, the natural buffering capacity of the stream water would further limit the acidification, yet earlier stream buffering capacity is characterized as "variable," and later in the document the NFK is characterized as naturally acidic.	Few recommend that you revise to support this conclusion, with specific data or data range from the project area.
83	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover, Potential Impacts of a Concentrate Spill from a Truck Rollover, Needs and Welfare - Socioeconomics	4.27-62	The PFEIS states there will be no additional benefit to socioeconomics from an ore concentrate spill, but there is no mention of potential negative impacts on socioeconomics.	Please include a description of the potential negative impacts on socioeconomics, or if there will be none, state so. An option is to use the language that is included with other spill scenarios: "Over the longer term, the impacts on employment, income, and sales would be negative if commercial and recreational fishing and/or tourism were to suffer due to the real or perceived impacts of the spill. Real or perceived water contamination could also negatively impact local business and consumers."

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
84	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover, Potential Impacts of a Concentrate Spill from a Truck Rollover, Commercial and Recreational Fishing	4.27-63	The first paragraph in this section refers to a "study," which lacks context.	We recommend that you revise text to remove reference to "study".
85	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover, Potential Impacts of a Concentrate Spill from a Truck Rollover, Subsistence	4.27-64	Clear and timely communication with communities is as important in easing concerns as quick response and cleanup. By committing to the ICS system for emergency management, the PLP is committing to either an Local On-Scene Coordinator or a Liaison position in the Command and General Staff. These positions would help to connect local communities to the spill response.	We recommend that you change last sentence in subsistence paragraph to read, "Quick response and cleanup of the spill, as well as clear and timely communication with nearby communities, would help ease concerns about contamination for subsistence users in nearby communities."
86	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Spill from a Truck Rollover, Potential Impacts of a Concentrate Spill from a Truck Rollover, Health and Safety	4.27-64	The statement, "Invisible contamination cannot be easily determined..." is misleading. Many Southwest Alaska community members clearly understand the value of chemical analysis of contaminants in environmental matrices, including water, fish, and sediments; measurement of these values by an unbiased source and communication of these results by a trusted source would decrease the effects of stress caused by contamination of communities' food and water. It is the spill itself that creates the anxiety.	Please delete this sentence here, and in all other spill scenario Health and Safety sections.
87	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Slurry Pipeline Rupture, Spill Response	4.27-66	The second paragraph of this section states, "Recovery of the spilled slurry material would be difficult due to its fluid nature. By the time crews would be able to mobilize for a cleanup, much of the slurry could have already been flushed downstream." Characterization of the fate of the slurry should follow through to the impacts analysis.	We recommend revising text in all Potential Impacts sections (especially noted in TSS and Turbidity, Sedimentation, Metals Leaching) of this scenario to reflect that there would be minimal slurry recovered.

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88	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Slurry Pipeline Rupture, Potential Impacts of a Concentrate Slurry Spill due to Pipeline Rupture	4.27-67	Here and throughout this scenario, the document uses "concentrate" when "concentrate slurry" is more accurate. This is an important distinction, especially in spill response.	Please revise to refer to "concentrate slurry," rather than "concentrate".
89	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Slurry Pipeline Rupture, Potential Impacts of a Concentrate Slurry Spill due to Pipeline Rupture, Acid Generation	4.27-68	Please align this paragraph with the expanded discussion of acid generation earlier in the document, to avoid imprecise terms like "trace" and "almost no" in the text. For more information, please see https://www.usgs.gov/special-topic/water-science-school/science/dissolved-oxygen-and-water?qt-science_center_objects=0#qt-science_center_objects	Please revise the text, incorporating information from the listed reference.
90	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Slurry Pipeline Rupture, Potential Impacts of a Concentrate Slurry Spill due to Pipeline Rupture, Wetlands and other Waters/Special Aquatic Sites, and Vegetation	4.27-69	The sentence, "Spills that occur during frozen conditions would have less impact and recovery would be faster," is not always true, for many of the reasons already discussed (e.g., under-ice water flow; broken ice conditions that may occur during winter).	We recommend that you delete the referenced sentences, or revise them to acknowledge the advantages and disadvantages of all ice-states: open water, ice-up and break-up (broken ice), and ice-covered, with or without under-ice open or flowing water on spill and cleanup probabilities.

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91	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Slurry Pipeline Rupture, Potential Impacts of a Concentrate Slurry Spill due to Pipeline Rupture, Wildlife	4.27-70	The first sentence states, "Under a spill scenario where concentrates enter a flowing river,…"	We recommend that you revise text to say, "Under this scenario, where contrate slurry enters a flowing river at a bridge, …"
92	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Slurry Pipeline Rupture, Potential Impacts of a Concentrate Slurry Spill due to Pipeline Rupture, Wildlife	4.27-70	A spill in a stream could also directly affect small mammals - voles, shrews, and lemmings - and aquatic mustelids such as beaver and muskrat by destroying feeding or denning habitat.	Please revise text to add these potentially impacted wildlife.
93	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Slurry Pipeline Rupture, Potential Impacts of a Concentrate Slurry Spill due to Pipeline Rupture, Wildlife	4.27-70	For text indicating untreated contact water could affect wildlife, please indicate duration of time.	We recommend that you revise text to indicate the duration of these impacts.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
94	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Slurry Pipeline Rupture, Potential Impacts of a Concentrate Slurry Spill due to Pipeline Rupture, Threatened and Endangered Species	4.27-72	Untreated contact water could have effects on prey resources, particularly salmon, for T&E species.	We recommend that you revise text to reflect effects of T&E species prey, particularly salmon.
95	4.27 SPILL RISK	4.27.6.7 Concentrate Spill Scenarios, Scenario: Concentrate Slurry Pipeline Rupture, Potential Impacts of a Concentrate Slurry Spill due to Pipeline Rupture, Commercial and Recreational Fishing	4.27-72	The statement, "given the presumption of spill cleanup," is misleading. The scenario presumption is that there will be minimal recovery of concentrate slurry.	We recommend that you revise the text to reflect the stated assumptions of a concentrate slurry spill to a stream (moving water).
96	4.27 SPILL RISK	4.27.7.1 Fate and Behavior of Spilled Reagents, Sodium Hydrogen Sulfide	4.27-78	Thank you for adding detail to the description of sodium hydrogen sulfide (e.g., the toxic nature of breakdown product H_2S). We suggest that additional details on the aqueous storage solution will inform risk estimation.	We recommend that you revise NaHS paragraph here and throughout the document to reflect that an aqueous NaHS solution is strongly alkaline (pH 11-12) and therefore extremely corrosive. NaHS can also produce H_2S in the presence of heat as well as acid.
97	4.27 SPILL RISK	4.27.8 Tailings Release	4.27-80	The statement, "PLP is proposing a method of tailings storage…that would eliminate the need for a traditional tailings pond…in perpetuity," while technically correct, is misleading. The most important variable - timeframe, in perpetuity - would not be different from other mining projects, as PLP is proposing to store the most environmentally toxic materials (pyritic tailings) sub-aqueously, in perpetuity in the mine pit. Given that the proposed operation is 20 years, and expanded operations would be up to 100 years, it will be a long time before those pyritic tailings make it into the mine pit, which is not proposed to be lined and which will function as a de-facto perpetual tailings pond.	In the third paragraph of this section, please remove the first sentence, which begins with, "PLP is proposing…"

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
98	4.27 SPILL RISK	4.27.8.3 Tailings Release, Fate and Behavior of Spilled Tailings	4.27-83	We appreciate the summary overview describing "the general fate and behavior of released tailings for a wide range of hypothetical releases." This is needed under all spill risk sections. A robust overview would be organized as hazardous material x mode of transport x mode of failure, to make sure that all potential spill scenarios are accounted for. For example, spills of diesel/ore concentrate and slurry from trucking accidents, for spills from pipelines, spills from vessels in distress, or spills of hazardous chemicals from all of their travel platforms. Include earthquakes, as was done in the Tailings Release section.	We recommend that you include a summary overview of fate and behavior or all other hazardous materials, organized in a robust and clear manner, in the beginning of the spill section or at the beginning of each sub-section.
99	4.27 SPILL RISK	4.27.8.3 Tailings Release, Fate and Behavior of Spilled Tailings, Water Content in the TSF	4.27-83	Thank you for providing details on the distance tailings releases would travel. This could be shown with maps, such as those provided in the DEIS, with the addition of modeled spill trajectories.	Please provide maps showing a range of modeled spill trajectories from each area of potential failure (i.e., each dam).
100	4.27 SPILL RISK	4.27.8.3 Tailings Release, Fate and Behavior of Spilled Tailings, Summer versus Winter	4.27-84	"Summer versus Winter" does not include the possibility of more difficult conditions in partial icing seasons - ice-up and break-up.	Please revise the paragraph to include broken or incomplete ice seasons.
101	4.27 SPILL RISK	4.27.8.3 Tailings Release, Fate and Behavior of Spilled Tailings, Acid, Tailings Solids Release	4.27-85	The last sentence of first paragraph is imprecise.	We recommend that you delete last sentence of first paragraph.
102	4.27 SPILL RISK	4.27.8.3 Tailings Release, Fate and Behavior of Spilled Tailings, Acid, Tailings Slurry Release	4.27-85	Throughout, the document should indicate the possibility that tailings will be incorporated into bedload.	Please change second-to-last sentence in first paragraph of this section to read, "….recovered, flush downstream, or incorporated into bedload."
103	4.27 SPILL RISK	4.27.8.4 Historical Examples of Tailings Releases	4.27-89	The Coeur d'Alene River impacts included mortality and sub-lethal impacts to waterfowl decades after operations.	Please review and incorporate Blus, Lawrence J., et al. "Lead toxicosis in tundra swans near a mining and smelting complex in northern Idaho." Archives of Environmental Contamination and Toxicology 21.4 (1991): 549-555.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
104	4.27 SPILL RISK	4.27.8.4 Historical Examples of Tailings Releases	4.27-89	The sentence, "Small- to moderate-volume tailings spills….would likely be recovered to conditions in compliance with state regulations," is problematic in that "small- to moderate-volumes" are not defined, and need to be for the reader to fully understand the intent.	We recommend that you provide example volumes for what the ACOE believes to be "small- to moderate-volume" spills.
105	4.27 SPILL RISK	4.27.4.1 Fate and Behavior of Spilled Diesel	4.27-9	"Wave action can emulsify, or break up, the oil into small droplets that stay suspended in the water column."	Please revise to carry this conclusion through to the effects section.
106	4.27 SPILL RISK	4.27.8.7 Existing Response Capacity	4.27-92	The phrasing in the sentence ending the second paragraph is inaccurate. Tailings are flushed downstream. The only way they would be flushed out of the watershed is if they reach the open ocean. Most of the presented spill scenarios do not indicate tailings will reach the ocean.	We recommend that you revise all text in the document that says tailings would be "flushed out of the watershed" to "tailings would be flushed downstream."
107	4.27 SPILL RISK	4.27.8.9 Tailings Release Scenarios	4.27-94 and elsewhere	We appreciate the effort and level of detail that went into the FMEA workshop and subsequent modeling of spill scenarios. The work and conclusions of the workshop participants should be used to an even greater extent in the spill risk section.	As discussed in other comments, readers would gain a more complete understanding of both probabilities and impacts of spills if visual or statistical summaries (i.e., maps and ranges) of modeling work were presented.
108	4.27 SPILL RISK	4.27.8.9 Tailings Release Scenarios, Suspended Tailings Solids	4.27-99	We appreciate the actual TSS data presented in the third paragraph of this section. All discussion of TSS in all spill risk scenarios should provide a similar level of detail, but they do not.	We recommend that you add this level of detail - actual measured data - to other TSS discussions throughout Section 4.27.
109	4.27 SPILL RISK		General Comment	We appreciate the additional detail that has been added to the spill risk section since the DEIS, particularly additional discussion of impacts. Although measured and predicted mercury (Hg) concentrations in the ore and concentrate, respectively, are lower than other metals, offsite migration of even very small amounts of total mercury into anoxic sediments, such as those occurring in wetlands throughout Alaska and the project area, will result in methylation to MeHg, the toxic and bioavailable form of mercury. MeHg is toxic, bioaccumulates, biomagnifies, and is higher in watersheds that have been mined compared to those that have not. Elevated MeHg in fish (particularly resident freshwater fish) and consumers of those fish is a real and likely impact of many of the spill scenarios resulting specifically from tailings spills and incorporation into bedloads of low-flow water bodies and wetlands.	Please revise to discuss the potential for MeHg generation, bioaccumulation, and biomagnification in spill scenarios, where spilled tailings remain in low-flow waterbodies including ponds, lakes, and wetlands.
110	4.27 SPILL RISK		General Comment	Selenium sulfide would be added to the pyritic tailings, and would be present in concentrate slurry; there is scientific literature on the toxicity of selenium to fish and wildlife.	We recommend that you revise to discuss the potential for elevated selenium from spills to affect fish, wildlife, and their habitats.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
111	4.27 SPILL RISK		General Comment	Throughout, "duration of impacts" is often confused with "duration of exposure" to the spilled constituents of concern in other parts of the ecosystem. This is especially evident in the diesel spill scenarios and tailings and water spills that include elevated metals concentrations. For example, duration of exposure of aquatic animals to diesel in the water column can be days to weeks (the time it takes to weather or dissipate); but impacts from that exposure can last for the lifetime of the animal.	We recommend that you revise, as appropriate, discuss "duration of impacts" versus "duration of exposure".
112	4.27 SPILL RISK			NOAA 2018i - Citation link no longer functional.	Proposed replacement weblink: https://response.restoration.noaa.gov/sites/default/files/Small-Diesel-Spills.pdf
113	Chapter 5 MITIGATION	Table 5-4	General Comment	Please review and incorporate previous comments provide by the USFWS.	We recommend that you review Enclosure 3 in the Department of the Interior's July 1, 2019 comment letter on the DEIS, to ensure the recommended USFWS Mitigation Measures are included in the revised Management Plans. The previously submitted Enclosure 3 is included as the second enclosure (Enclosure 2) in these PFEIS comments.
114	Appendix G BA	Entire	Entire	The BA in the PFEIS is a previous version.	We recommend including an updated BA, per our previous discussions, in the public FEIS.
115	Appendix K 4.25 T&E	K4.25.1	K4.25-1	The USFWS works with applicants to make modifications to project design and/or develop mitigation measures to minimize take associated with activities. In areas where sea otter densities are high, such as Kamishak Bay, it may not be possible for USFWS to meet determinations necessary for authorization of Incidental Take under the MMPA. It is premature to discuss whether the submission of an application for Incidental Take Authorizations or Regulations under the MMPA will result in issuance of such an authorization.	Recommend revising lanugage in this section to better reflect the process for seeking incidental take under MMPA rather than conveying the assumption that incidental take will be granted, as it is pre-decisional.

#	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
116	Appendix K 4.25 T&E	K4.25.1	K4.25-4	Aircraft are stated to be the most significant source of airborne sounds for sea otters on p K-25-4, however the focus of effects of aircraft is on duration and levels of sound below the water's surface during flyovers. Aircraft sounds are greater above the water's surface and are higher during takeoff and landing than during a flyover (Newman and Rickley, 1979). Both Appendix K4.25 and Section 4.25 state that proposed flights to and from the port would generally occur over 1,000 feet except during takeoff and landing. Given that 1) the port location is close to the water, 2) the purpose of the airport is for takeoffs and landings, and 3) the USFWS 2019 citation on p 4.25-30 used to support the notion that behavioral disturbance will be "minor" involved overflights at 1,000 feet and not takeoffs and landings, the case is not made that aircraft operations associated with the port will have only minor effects on sea otters.	We recommend that you delete following from p K4.25-4 "Proposed flights to and from the port would generally occur over 1,000 feet except during takeoff and landing."
117	Appendix K 4.25 T&E	K4.25.1	K4.25-4	Two in-water received sound levels are given for a Bell 212 - the second should be for an Orion P-3, a four-engine turboprop.	We recommend that you revise as noted.

NPS Comment Number	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	Full Citation/References
1	Chapter 2 Alternatives	2.2.4 Applicant's Preferred Alternative	2-11	Alternatives do not identify vessel routes to and from the Amakdedori Port Facilities site.	Recommend including information on vessel routes to and from Amakdedori Port Facilities site to understand some potential impacts for Katmai National Park, similar to the air flight paths map made for K3.12 Transportation.	
2	3.1 Affected Env't.	3.1.4 Traditional Ecological Knowledge	3.1.6	Suggestion for more enhanced description.	Under 3.1.4, first paragraph, suggest starting with: "The people of the Lake Clark and Lake Iliamna region have lived there for centuries, and Lake Clark National Park and Preserve protects a tapestry of cultural places woven from 10,000 years of human occupancy that is vital to the cultural and spiritual continuance of the people who live there. These people have developed a unique culture that evolved from the environment. Their knowledge base has evolved through a system of learned experience, through direct observations and through trial and error. Working directly with local communities and looking at case studies relating to the lifeway and connection to the environment and food sources and understanding what Traditional Ecological Knowledge means can provide a more solid and tangible starting point."	
3	3.1 Affected Env't.	3.1.4 Traditional Ecological Knowledge	3.1-6-7	The EIS sees TEK as a body of knowledge about climate, landscapes, and subsistence resources, and including a historical perspective, but this characterization does not capture its cultural significance. Because TEK is an accumulation of data acquired over thousands of years, the depth and breadth of this knowledge is vast.	Suggest the EIS could be strenghtened by adding a sentence: "TEK is a culturally significant accumulation of data acquired over thousands of years, with a vast depth and breadth of knowledge."	
4	3.9 Subsistence	Intro/first page	3.9-1	The subsistence dependent lifestyle of the local people is based on centuries if not millennia of cultural TEK. The EIS should acknowledge the possible interruptions and discontinuities in implementation and transmission of TEK.	Under 1st paragraph, recommend adding: "Subsistence is based on TEK that has been shared and transmitted for many generations. Interruptions and discontinuities that affect implementation and transmission of TEK may also affect subsistence lifeways in the area."	
5	3.9 Subsistence	3.9.3.4 Nondalton	3.9-22	Thank you for adding information about the deep family significance of fish camps and sharing links between villages. This can be emphasized throughout for all communities, not just Nondalton.	Suggest adding deep family significance for fish camps, and kinship ties and sharing links for all communities listed for subsistence harvest planning section (3.9.3)	
6	3.24 Fish Values	General comment	N/A	A single figure indicating all tributaries that would be impacted directly (removed) by mine development would be very helpful for understanding impacts.	Recommend including a figure indicating tributaries that would be impacted directly by mine development.	

NPS Comment Number	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	Full Citation/References
7	3.24 Fish Values	3.24.3.2 Anadromous and Resident Fish Distribution	3.24-25	The lack of fish detected in an area does not indicate poor habitat. Fish may be absent or in low abundance during some years/time periods, but abundant in other years/time periods. This issue is acknowledged on pg. 3.24-25 in newly added text for North Fork Koktuli River, but should be acknowledged across all of the tributaries/streams.	Recommend either providing data to support claims of lower quality/low-use habitat or remove sentences that claim this.	
8	3.24 Fish Values	Table 3.24-11 Freshwater Resident Fish Species Known to Occur...	3.24-43-44	While the fish information has been greatly expanded in this section, the number and types of fish species present in each study area is presented inconsistently, which makes it difficult to understand.	Suggest modifying the newly added Table 3.24-11 the number and names of all anadromous and resident species found in each drainage/area. Recommend modifying terminology regarding anadromous or resident species to match across figures and tables.	
9	3.24 Fish Values	3.24.4 Transportation Corridor and Natural Gas Pipeline Corridor	3.24-63-75	It is difficult to assess the potential impacts to anadromous and resident fish along the proposed Mine Access roads and Port Access roads with the current information provided in the new sections.	Suggest the EIS would be strenghtened with the addition of the types of streams, rivers, and other water bodies that might be impacted along these corridors – similar to in the Mine site area.	
10	3.24 Fish Values		3.24-72-79	EIS could be strenghtened with minor technical edits to this section.	Recommend addition of Newhalen River salmon escapement data in this section and in Table 11, minor corrections to analysis of fish migration, and additional information from report references.	NPS will send Newhalen River salmon escapement data and other specific suggestions.
15	4.9 Subsistence	N/A	4.9-1	The magnitude of impact from the project depends on the past and current level of subsistence use that would be impacted, the extent to which opportunities to harvest and experiences are altered, as well as the ability of subsistence users to use alternative areas with similar harvest opportunities and experiences.	Recommend adding another sentence at the end: Relocation to another harvest area, even if there are similar harvest opportunities, may present many difficulties, including relationships with other communities, expenses of harvest, and transmission of TEK over generations.	
16	4.9 Subsistence	4.9.3.3 Changes in Competition for Resources	4.9-10	Thank you for adding information about the potential for non-local employees to compete for resources by recreational hunting and fishing. Competition from other local subsistence users is mentioned in the context of population growth in communities near the mine. Impact of changes in competition for resources in adjoining areas, if subsistence users in the mine area need to travel outside the area to harvest should also be considered.	Add sentence describing impact for subsistence users who need to travel out of the mine area to harvest facing increased competition for resources in adjoining areas with other local subsistence users already traditionally using that area.	
20	4.23 Wildlife Values	last paragraph in section	4.23-2	"…no measurable effects on wildlife populations are anticipated." The document acknowledges that the development will likely affect the distribution of wildlife both temporarily and long term. Affecting the distribution is an effect on the population. It might not be a direct numerical effect, but the change is distribution could be more impactful to subsistence users than a numerical change.	Recommend using the text "…measurable effects on wildlife populations would be limited".	

NPS Comment Number	Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action	Full Citation/References
25	4.24 Fish Values	4.24.3 Applicant's Preferred Alternative	4.24-10	Tables and Figures referenced for Sec 3.24 on page 10 are incorrect.	EIS could be strengthened by correcting the table.	
31	4.26 Vegetation	4.26-2	4.26-3	There is a great deal of lichen habitat in the mine site area, and lichen are very slow growing. Thus, lichen recovery likely take longer than many other vegetation types, thus effecting subistenance caribou hunting.	Please include sentences in first paragraph for lichen, "Lichens are extremely slow growing and take decades to over a century to recover following catastrophic disturbance such as wildfire (Joly et al. 2010). Indeed, although former lichen habitat following fire has tended to be rich in graminoids, it has stayed low in lichen cover for more than 55 years, and is generally avoided by caribou for winter forage. Full recovery is estimated to take as long as 160 years (Black and Bliss 1978). "	Black, R.A., Bliss, L.C., 1978. Recovery sequence of Picea mariana – Vaccinium uliginosum forests after burning near Inuvik, Northwest Territories, Canada. Canadian Journal of Botany. 56:2020–2030. Joly, K., F.S. Chapin, and D. R. Klein. 2010. Winter habitat selection by caribou in relation to lichen abundance, wildfires, grazing, and landscape characteristics in northwest Alaska. Ecoscience 17(3):321-333.
34	4.27 Spill Risk	4.27.6.10 Iliamna Lake Ferry Rupture	4.27-74	We appreciate that you have included an accident scenario and effects where a ferry transporting ore sinks or has some mishap and the ore ends up in Iliamna Lake. However, our concern was how might such an accident impact the rearing, migrating, incubating salmon and resident species and this was not addressed. The concern is that copper/Zn ore will be released into Iliamna Lake. The lake is extremely dilute and has a low buffering capacity.	Please include information about how an ore release would affect Iliamna Lake, since the lake is the world's most important sockeye salmon nursery lake, and potential impacts from an accidental spill or barge accident should be considered and analyzed for this FEIS.	McIntyre et al 2012 Low-level copper exposures increase visibility and vulnerability of juvenile coho salmon to cutthroat trout predators Ecological Applications, 22(5), 2012, pp. 1460–1471
37	K4.24 Fish Values	K4.24.4.2 Sulfate Loading and Mercury Methylation	K4.24-8	This section could be strengthened by incorporationg wetlands, which are a key location for methylmercury production by anaerobic bacteria.	Recommend adding to this paragraph baseline data for hydrologically connected wetlands (e.g., DO, ORP) or, if no data exists, then suggest acknowledging this gap.	Nagorski, S.A., D.R. Engstron, J.P. Hudson, D.P. Krabbenhoft, E. Hood, J.F. DeWild, and G.R. Aiken. 2014. Spatial distribution of mercury in southeastern Alaskan streams influenced by glaciers, wetlands, and salmon. Environmental Pollution 184:62-62.
38	K4.24 Fish Values	K4.24.5 Instream Flow Modeling Results	K4.24-10	This section could be strengthened by incorporating climate-modulated changes into the instream flow model.	Please include projected climate-modulated changes to stream flow amount and timing for the instream flow model.	Wobus, C., R. Prucha, D. Albert, C. Woll, M. Loinaz, and R. Jones. 2015. Hydrologic alterations from climate change inform assessment of ecological risk to Pacific salmon in Bristol Bay, Alaska. PLoS ONE 10(12):e0143905. https://doi:10.1371/journal.pone.0143905.

From:	McCall, John A
To:	POA Special Projects
Cc:	Monkelien, Kyle E; Fish, David S
Subject:	[Non-DoD Source] Re: [EXTERNAL] REMINDER: Cooperating Agency comments on the PFEIS due Monday, March 23rd (UNCLASSIFIED)
Date:	Monday, March 23, 2020 6:50:36 PM
Attachments:	2020_0323_BSEE_USACE PFEIS Comment Letter_DS.pdf

Katie, BSEE is providing the Corps of Engineers our comment letter for the Pebble EIS process, specifically to the PFEIS version submitted to our Regional office. We hope to continue discussions with AECOM, as needed, in order to clarify any further required responses on our behalf for the PFEIS.

Respectfully,

John A. McCall
Petroleum Engineer, Alaska Office of Field Operations
Bureau of Safety and Environmental Enforcement (BSEE)
United States Department of the Interior
Office (direct): 907.334.5308
Office (main): 907.334.5300

From: POA Special Projects <poaspecialprojects@usace.army.mil>
Sent: Friday, March 20, 2020 14:55
To: Bob Loeffler <bobl@jadenorth.com>; Merrell, Brooke <brooke_merrell@nps.gov>; Yeargan, Catherine <catherine_yeargan@fws.gov>; Curyung Tribal Council <tribaladmin@curyung.com>; Daugherty, Linda (PHMSA) <linda.daugherty@dot.gov>; Fish, David S <David.Fish@bsee.gov>; David Seris (David.M.Seris@uscg.mil) <David.M.Seris@uscg.mil>; Cooper, Douglass <douglass_cooper@fws.gov>; Kim, H. Sharon Sharon <Sharon_Kim@nps.gov>; Hassell, David (PHMSA) <david.hassell@dot.gov>; J. Loichinger <jloichinger@achp.gov>; Kluwe, Joan <Joan_Kluwe@nps.gov>; John Eddins <jeddins@achp.gov>; Monkelien, Kyle E <Kyle.Monkelien@bsee.gov>; Fesmire, Mark E <Mark.Fesmire@bsee.gov>; Colligan, Mary A <mary_colligan@fws.gov>; McCafferty, Katherine A CIV USARMY CEPOA (USA) <Katherine.A.McCafferty2@usace.army.mil>; McCall, John A <John.McCall@bsee.gov>; 'Mcgrath.patricia@epa.gov' <Mcgrath.patricia@epa.gov>; Molly Vaughan <Vaughan.molly@epa.gov>; Moselle, Kyle W (DNR) <kyle.moselle@alaska.gov>; Nathan Hill <manager@lakeandpen.com>; POA Special Projects <poaspecialprojects@usace.army.mil>; Robert Guisinger <robert.guisinger@dot.gov>; William Evanoff <nondaltontribe@yahoo.com>; Wesley Furlong <wfurlong@narf.org>
Cc: Bill Craig <bill.m.craig@aecom.com>; Bellion, Tara <tara.bellion@aecom.com>; Bellion, Tara <tara.bellion@aecom.com>
Subject: [EXTERNAL] REMINDER: Cooperating Agency comments on the PFEIS due Monday, March 23rd (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Good Afternoon Cooperating Agencies,

The purpose of this email is to remind Cooperating Agencies that the deadline to submit comments on the Preliminary Final EIS, to USACE, is this Monday, March 23, 2020.

We hope that you and your loved ones are healthy and that you, and they, remain safe and well. Have a good weekend.

Sincerely,

Katie McCafferty
Project Manager
Direct: 907-753-2692

U.S. Army Corps of Engineers-Alaska District
Regulatory Division
P.O. Box 6898
JBER, AK 99506
main office line: 907-753-2712

CLASSIFICATION: UNCLASSIFIED

United States Department of the Interior

BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT

March 23, 2020

From: Kyle Monkelien, Regional Supervisor, Alaska Region

Reply to: John McCall, Alaska Office of Field Operations, john.mccall@bsee.gov or 907-334-5308.

To: Regulatory Division, Alaska District, U.S. Army Corps of Engineers

Subject: Pebble Mine Project Preliminary Final Environmental Impact Statement

The Bureau of Safety and Environmental Enforcement (BSEE) has completed its review of the Preliminary Final Environmental Impact Statement (PFEIS) for the Pebble Mine Project released by the U.S. Army Corps of Engineers (USACE) on February 7, 2020. BSEE staff are continuing to work with the USACE's EIS contractor, AECOM, directly to address the agency's needs. BSEE's comments on the Draft EIS continue to inform our work with AECOM, as they were not incorporated as part of the PFEIS due to their timing.

BSEE reiterates that at a high level, in order for BSEE to adopt the final EIS it must include analysis of the potential impacts and associated mitigation measures related to the proposed right-of-way through the outer continental shelf (OCS) portion of Cook Inlet. This must include the potential effect of the associated pipeline construction and operations on the human, marine, and coastal environments, life (including aquatic life), property, and mineral resources in the entire area during construction and operational phases (30 CFR 250.1016). For example, the impacts from varying construction/excavation techniques must include turbidity as well as underwater sound impacts on the environment.

Similarly, BSEE will continue to work with AECOM to ensure the OCS portion of the pipeline is consistently considered throughout the final EIS. The final EIS must contain consistent baseline information for all three alternatives and equally analyze the proposed impacts of the pipeline construction and operations on the Cook Inlet environment for all three alternatives.

We appreciate the opportunity to review the PFEIS and to work with AECOM to revise the document further to address the issues raised in BSEE's comments on the Draft EIS before the final EIS is published.

Section or Chapter Name	Subsection, Figure, or Table Name	Page #	Comment/Issue	Recommendation/Action
4.18			Section 4.18 does not delve into greater detail offering information regarding specific impacts to water quality associated with construction of bridges across the Newhalen and Gibraltar Rivers	Specifically address sediment/fugitive dust transport into waterbodies crossed by bridges.
TBD			PFEIS does not state whether a WQC is required nor does it mention application status.	Explain process for obtaining WQC from the State of Alaska.
4.18		29	There is some discussion on pp. 4.18-29 regarding the placement of gravel fill at “certain bridge abutments” in order to “protect the bridge structures and substrate from erosion,” but nothing more substantive than that with regard to water quality	FEIS should note that construction impacts will be short-lived. "Gravel" is typically not the type of fill typically used to combat erosion near bridge. "Armor Rock" might be a better term to use.
			PFEIS does not have detailed description of wetlands existing within the proposed project area (either relevant to the bridge sites or the project as a whole) is offered within the context of the PFEIS	FEIS should direct the reader toward where this information is available.
4.22		41 & 62	Impacts to wetlands for both the Newhalen and Gibraltar bridges are discussed, but limited to the placement of pilings (in the case of Newhalen, a “direct footprint…(of) 201 square feet in perennial riverine habitat” and in the case of Gibraltar, direct impacts to “0.2 acre of broad-leaved forested wetland” associated with construction of a temporary bridge. The same level of impact associated with the Gibraltar River crossing is described on pp. 4.22-41 (Alternative 1) and on pp. 4.22-62 for the Newhalen River under Alternative 2. Impacts for the North and South Newhelen crossings are identical. Same for Alternative 3 (Newhalen). Again, although impacts to wetlands associated with bridge construction area addressed, not much is offered in terms of overall level of detail specific to the same	
			No record of consultation or coordination efforts regarding impacts to wetlands or recommended mitigation measures found in the PFEIS	Add statement referring to where this information may be obtained, appendix or RFI.

			No indication if the project is located in the base floodplain. 100-year flood elevation not furnished. No copies of any consultation or coordination with FEMA regarding the same	
			No statement if the project requires a conversion of land funded by the Land and Water Conservation Fund Act	
			Migratory Bird Treaty Act/EO 13186 - A qualified "yes." Based on a 2019 aerial survey of the area surrounding the Newhalen crossing, it was determined that no species covered under the MBTA were located within the vicinity of the proposed project. No bald or golden eagle nests were discovered within the vicinity of the proposed Gibraltar River crossing. More in-depth analyses may be required though	Clearly state in the FEIS that take permits will be obtained if needed.
2.5.2		23	The PFEIS is silent on the subject of possible improvements or enhancements to the existing Williamsport - Pile Bay road.	Include a description of any road/bridge enhancements to the existing road.

From:	Bob Loeffler
To:	McCoy, Shane M CIV USARMY CEPOA (USA)
Cc:	Craig, Bill; Evans, Jessica; Jon Isaacs; Nathan Hill; Kate Conley
Subject:	[Non-DoD Source] LPB Comments on PFEIS
Date:	Monday, March 23, 2020 6:40:56 PM
Attachments:	PFEIS response to Borough 3.23.2020.pdf

Shane,

Attached are the Lake and Peninsula Borough comments on the PFEIS. I presume an e-mail copy is adequate. If you need a hard copy, please let me know. And if you have questions, also please contact myself or Nathan.

Stay healthy,
- Bob

Bob Loeffler
bobl@jadenorth.com
907-250-4621

Lake and Peninsula Borough
P.O. Box 495
King Salmon, Alaska 99613

Telephone: (907) 246-3421
Fax: (907) 246-6602

March 23, 2019 Via Email

Shane McCoy, Program Manager, Regulatory Division
U.S. Army Corps of Engineers, Alaska District
P.O. Box 6898
Joint Base Elmendorf-Richardson, Alaska 99506-0898

Dear Shane:

This letter provides information from the Lake and Peninsula Borough (LPB) for the preliminary draft of the final Environmental Impact Statement (PFEIS) for the proposed Pebble Mine. For this letter, we did not review the entire PFEIS, but rather reviewed the Borough's comments on the draft EIS to determine whether our comments were adequately addressed. We also reviewed sections of the PFEIS for which we are a cooperating agency. Finally, this letter does not provide a LPB position about whether the mine should be permitted; it solely provides information for PFEIS.

Section 4.24. Ferry's Effect on Juvenile Salmon. In our letter commenting on the draft EIS, we provided significant comments on the potential effect of the ferry on juvenile salmon in Lake Iliamna. We note and appreciate the expanded sections about the fishery resources of Iliamna Lake and the expanded information and literature concerning behavior and distribution of juvenile salmon and the potential effect of the ferry. Nevertheless, the conclusions about behavior of salmon are based on other locations which are not substitutes for research occurring in Lake Iliamna. We also note that the literature, while helpful, does not support any particular conclusion with certainty. Given the lack of studies specific to Lake Iliamna, many of us remain concerned about the potential effect of the ferry on juvenile salmon. We strongly recommend that additional work, based in Lake Iliamna, be completed before permits are issued.

Section 4.7. Cultural Resources at the Amakdedori Port. In our comments on the draft EIS, we noted the significant personal and cultural value of the village site, other artifacts, and potential grave sites near the proposed Amakdedori Port. The Borough is working to gather information and to potentially identifying sites near the port, but we will use any new information we gather through the Section 106 Programmatic Agreement and other processes. The information we gather will is not likely to be timely for use in the final EIS.

Other comments. We made a number of other comments on the draft EIS. Most were accommodated in the PFEIS. Thank you. There are four that need further work. They are discussed below. (The first two were provided to Jessica Evans of AECOM at the Cooperative Agencies Review meeting in the Meghan Room. They are repeated here for completeness.)

Section 4.3 Socioeconomics (Transportation). In the Borough's comments on the draft EIS, we indicated that "The Borough expects to work with landowners, the state, and the project applicant to develop a road management agreement which provides rules for how the road will accommodate use by Borough residents and businesses." In retrospect, we were not explicit enough. We were reacting to the sentence in the draft EIS, and now in the PFEIS, which implies that the road agreement is at the discretion of PLP and that PLP has agreed to work to achieve such an agreement. The implication is inaccurate; it is not at PLP's discretion. It is likely to be a requirement of the Lake and Peninsula Borough's large project permit.

Please change the first paragraph under Transportation on page 4.3-7 as indicated:

> The Applicant's Preferred Alternative would expand the transportation infrastructure in the region once the transportation corridor and ferry/port facilities are complete. Although the mine and port access roads and port are described as privately owned, ~~PLP has stated that they would work with all local communities to identify the best solutions for controlled use~~ the Lake and Peninsula Borough's expects that, under the authority of its large project ordinance, a road management agreement involving all of the landowners will allow use of the access roads and ferry for community transportation needs ~~(PLP 2018-RFI 027)~~. This ~~which~~ would help reduce the local cost of living, including the crossings of the Newhalen and Gibraltar rivers. The State of Alaska and Alaska Native Claims Settlement Act (ANCSA) corporation land owners may also provide conditions on permit approval for the portion of the transportation route on their lands. Access to the infrastructure would be limited to local residents and businesses; it would most likely consist of escorted, scheduled convoys for private vehicle transport, and require coordination with PLP for third-party commercial-haul traffic. Road traffic would be coordinated with scheduled third- party transportation by the ferry.

It is the sentence that is crossed off which implies that the decision about road's community use is at PLP's discretion. In fact, it will be a significant area of focus under the Borough's Large Project Ordinance. The sentence we suggest conveys the same meaning you were attempting, but without the problematic implication.

Section 4.3 Socioeconomics (Education). A description of possible vocational education in the LPB schools erroneously implies that education our students will be done by PLP, not the school district. This may have been a misinterpretation of a borough comment. In any case please change the second paragraph under Education on page 4.3-7 as indicated.

> While the project is not anticipated to result in an increased number of schools in the region, it may benefit educational opportunities for some communities through an increased revenue stream to the LPB and access to PLP-supported education programs. Because of declining population (i.e., out-migration) in some communities, schools are at risk of closing (LPB 2012). The project could reduce or eliminate this decline, allowing local schools to remain open and continue to serve local communities. ~~Training and education programs provided by PLP at schools would require the agreement of the school district.~~ Tax revenues from the project may also allow the school district to offer expanded services such as expanded vocational education. ~~The LPB's Large Project~~

~~Ordinance would require that any expansion of school facilities due to the project would be paid for by the **project through increased tax revenues**.~~ Conversely, steady employment and income may provide some families the ability to move to other areas, which may decrease the population of some communities.

Appendix M, Mitigation for Potential Ferry Impacts. On page M-36, the third mitigation measure concerns monitoring the ferry crossing for evidence of smolt/fish impacts. The PFEIS evaluation indicates, as part of the second evaluation measure, that there is "No clear agency jurisdiction." That is incorrect. The potential mitigation measure is squarely within the jurisdiction of DNR's Plan of Operation approval and potentially within the jurisdiction of the LPB's Large Project Ordinance permit. Please change the incorrect statement, which also changes the conclusion about the likelihood for the mitigation measure being applied from "possible" to "probable."

Appendix M, Designating Pick-up Points for Employees. On page M-36, the first mitigation measure concerning "designated pick-up points" for employees includes inconsistent information. In the third evaluation measure, the PFEIS indicates, "Designating all communities in the LPB would not be practicable; however, it is likely that PLP would transport workers to the mine site at no cost to the employee." This language is internally inconsistent. By "designating a community as a pick-up point" all we mean is that the mine would transport the employee from the village to the mine site without charge. Your sentence indicates that the mine would not designate each village as a pick-up point but would transport the employee without charge. That is inconsistent information.

We note this mitigation measure is fully and completely with the jurisdiction of the Lake and Peninsula Borough through its large project ordinance. While we cannot determine the stipulations in our permit at this time, it is completely within the Borough's power to add this stipulation (that employees from the Borough's established communities would be transported without charge). Further, we note that the Red Dog Mine transports employees without charge from all villages within the Northwest Arctic Borough, and the that the Illinois Creek Mine, while it was operating, did so for all of the nearby villages as well. Please change the evaluation measure to indicate that – whatever you call it – it is reasonable to transport employees from all of the Borough's villages to their respective work site without charge to the employee. We note that this will change the conclusion in the third column about the likelihood of the mitigation being used from "possible" to "probable."

Thank you for the opportunity to comment. If you have questions, please contact me at the phone number above or manager@lakeandpen.com. You may also contact Bob Loeffler (907-250-4621; bobl@jadenorth.com).

Sincerely,

Nathan Hill
Borough Manager

cc: Lake and Peninsula Borough Assembly
Lake and Peninsula Borough Planning Commission

From:	Courtenay Carty
To:	POA Special Projects; Borders, Phillip J (Phil) COL USARMY CEPOA (US); Campbell, Kendall D CIV USARMY CEPOA (USA); Thomas Tilden; Gayla Hoseth; JJ Larson; KIMBERLY WILLIAMS; Carol Luckhurst; Teresa Seybert; Harold Samuelsen; Peter Van Tuyn; Karen Schmidt
Cc:	Wesley Furlong; Bob Loeffler; Brooke Merrell; Catherine Yeargan; Daugherty, Linda (PHMSA); David Fish BSEE; David Seris (David.M.Seris@uscg.mil); Douglass Cooper; H. Sharon Kim; Hassell, David (PHMSA); J. Loichinger; Joan Kluwe; John Eddins; Kyle Monkelien - BSEE; Mark Fesmire; "mary_colligan@fws.gov"; McCafferty, Katherine A CIV USARMY CEPOA (USA); McCall, John; "Mcgrath.patricia@epa.gov"; Molly Vaughan; Moselle, Kyle W (DNR); Nathan Hill; Robert Guisinger; Bill Craig; Bellion, Tara; Matthew Newman; Megan Condon; nondaltontribe@yahoo.com
Subject:	[Non-DoD Source] Curyung Tribal Council Comments on Pebble PFEIS
Date:	Monday, March 23, 2020 8:19:25 PM
Attachments:	Curyung CA Comments on PFEIS March 23, 2020.pdf
Importance:	High

Good Afternoon,

Attached you will find Curyung's comments on the PFEIS for the proposed Pebble Project. The package includes:

- Pages 1-3: Cover letter from First Chief, Thomas Tilden and Tribal Administrator, Courtenay Carty
- Pages 4-26: Curyung's redline edits and comments on the Cooperating Agency technical meeting notes for the March 2020 meetings
- Pages 27-44: Curyung's technical comments on the PFEIS
- Pages 45-52: Compilation of supporting studies, reports, and literature

We hope this message finds you all in good health and spirits. If you have any questions or would like to follow-up on any of the comments provided by Curyung, please do not hesitate to email or call.

Quyana,

Courtenay

Courtenay Carty
Tribal Administrator
Curyung Tribal Council
PO Box 216 - 715 Seward Street
Dillingham, AK 99576
907-842-2384
907-842-4510 fax

Sent from Mail for Windows 10

Curyung Tribal Council

P.O. Box 216 – 715 Seward Street
Dillingham, Alaska 99576
Phone: (907) 842-2384 - Fax: (907) 842-4510

Col. Philip J. Borders
Alaska District Commander
U.S. Army Corps of Engineers
P.O. Box 6898
JBER, AK 99506-0898
Phillip.J.Borders@usace.army.mil

Shane McCoy
Project Manager
U.S. Army Corps of Engineers – Alaska District
P.O. Box 6896
JBER, AK 99506-0898
poaspecialprojects@usace.army.mil

March 23, 2020

RE: Pebble Project (POA-2017-00271), Curyung Tribal Council Comments on Preliminary Final EIS and the NEPA Process, and a Request for Government-to-Government Consultation

Dear Colonel Borders and Mr. McCoy:

In our role as a cooperating agency for the Pebble Project Environmental Impact Statement (EIS), Curyung Tribal Council (Curyung) hereby submits: (1) our comments on the cooperating agency technical meeting notes for the March 2020 meetings; (2) our technical comments on the Preliminary Final EIS (PFEIS); and (3) supporting materials for incorporation into the EIS.

We reiterate our concern that 45 days was not sufficient time to review and provide meaningful feedback on the PFEIS given the breadth of changes to the project proposal and EIS analysis, which has been compounded in the last two weeks by the outbreak of COVID-19 limiting tribal resources, as well as distracting from the tribe's role in important and urgent COVID-19 response measures for our community. In this time, we have been on multiple teleconferences with the Federal Emergency Management Agency, Health and Human Services, Indian Health Services, Bureau of Indian Affairs, state, military and municipal partners, tribal health care organizations, and others. We have crafted and adopted emergency plans and issued important disaster declarations that open the door to critical aid for our tribal members. In fact, Pebble is the only issue that we work on where deadlines have not been adjusted out of a sensitivity to the current National Emergency; a fact that is inexplicable to us.

It is clear from our participation in the cooperating agency technical meetings and from our review of the PFEIS that the Corps is not looking at the full potential impact of the proposed Pebble mine on fish, wildlife, or subsistence as required under NEPA. This is evidenced in our notes from the March 9-11 meetings attached to this letter. Overall, Curyung objects to the Corps' near-wholesale deferral of project analysis to the state permitting process on a variety of important issues such as tailings dam designs and quantifying impacts to fish habitat and water quality. This deferred analysis makes the PFEIS document deficient. Moreover, Curyung has particular concerns with the PFEIS's inadequate characterizations of subsistence and salmon habitat and insufficient analysis of impacts to salmon, salmon habitat, wetlands, streams, wildlife, regional infrastructure and cultural resources; as well as improperly limiting analysis of tailings dam failures, downstream impacts, and mine expansion and economic feasibility. Our specific concerns with the PFEIS are detailed in technical comments attached to this letter.

Curyung once again reiterates our objections to the Corps' NEPA process and failure to commit to issuing a new Draft EIS for public review despite more than a dozen project changes, voluminous new information submitted by the Pebble Limited Partnership (PLP) since the Draft EIS was released, remaining data gaps and missing analysis, and a new compensatory mitigation plan lacking public review. NEPA mandates an

opportunity for the public to review the voluminous changes to PLP's proposed project and new analysis of impacts, all of which post-date the Draft EIS, prior to the Corps issuing a Final EIS for the project.

Curyung thus formally requests government to government consultation meetings with you and your staff regarding a 404 permit application and compensatory mitigation for the proposed Pebble Mine Project. From our previous government to government meetings, our review of the PFEIS, and our participation in cooperating agency meetings, Curyung has serious and unresolved concerns with the NEPA and 404 processes, such as major data gaps and flaws in the EIS analysis, concerns about the inadequate analysis of the impacts to salmon and subsistence and Curyung tribal members and our community and neighbors, and concerns with an inadequate compensatory mitigation plan. Any 404 permit issued to PLP based on the current project design, insufficient compensatory mitigation, and lacking analysis of impacts to waters and salmon would result in significant adverse impacts on important fish, wildlife, subsistence, and aquatic habitats and would be contrary to the public interest. Based on the record before the Corps, Curyung strongly recommends denial of a 404 permit to PLP. We would like to discuss the basis of our recommendation that the 404 permit be denied in government to government meetings with the Corps.

The Corps promised the cooperating agencies and public a meaningful and robust NEPA process for the proposed Pebble Mine Project. The Curyung Tribal Council believed we could assist in achieving this aim through participation as a cooperating agency. We would be remiss in these – our closing remarks as a cooperating agency -- if we did not clearly state to you that the NEPA process to date has not been meaningful or robust for our tribe and its members, and we believe to the people of Bristol Bay and Alaska in general.

As but one example, the Corps has been solely schedule-driven in its decision-making. It has cast aside many legitimate requests of tribes, Bristol Bay residents and stakeholders, and independent and agency experts, for more time to review, understand and provide meaningful input on the Pebble Project Clean Water Act 404 permit application and associated and voluminous information related to its potential impacts on Bristol Bay, its salmon and people. Not once has the Corps cleanly identified a national interest that would justify its rushed and intentionally-blindered NEPA process over the interests of tribes, Bristol Bay residents and other stakeholders, and Alaskans in general, in such a meaningful and robust process.

We would also be remiss if we did not express our disappointment in the Corps' handling of the cooperating agency process. The Curyung Tribal Council did not lightly accept your invitation to be a cooperating agency, as we knew the economic and opportunity costs to us of committing to your process would be high. Yet we felt we owe it to our members to do what we can to ensure that the project applicant and the federal permitting authorities meet their burdens for a project as fundamentally risky to Bristol Bay, its salmon and people, as the proposed Pebble mine. Yet, from the beginning the Corps sought to artificially limit the input of cooperating agencies to narrow issues, especially including limiting the role of tribal participants. The Corps also rejected, also without understandable justification, requests for more time for cooperating agency review and input of critical NEPA documents (including due to the current National Emergency). And on the substance, the Corps seems to equate the act of listening to issues raised by cooperating agencies with meaningfully addressing those issues. Time and again, including as reflected in the notes from the recent technical meetings, the Corps would only acknowledge as action items those issues which can be addressed without impact on its desired schedule, and reject or gloss over any suggestions that would threaten that desired schedule. Along with other tribes from the region, we are the experts on Bristol Bay, and yet the Corps' repeatedly shunted aside our input. Our frustration is acute.

In conclusion the Curyung Tribal Council does not believe that the Clean Water Act and NEPA permitting processes for the proposed Pebble mine, to date, have integrity, and in our view neither the project applicant nor the Corps has met their burdens to ensure informed decision-making about the proposed Pebble mine.

Sincerely,

Thomas Tilden
First Chief, Curyung Tribal Council

Courtenay Carty
Trial Administrator

Enclosures

1. Curyung Tribal Council's comments on cooperating agency meeting notes for meetings held on March 9-11, 2020.
2. Curyung Tribal Council's technical comments on the Preliminary Final EIS
3. Supporting materials and reports

Curyung Tribal Council
P.O. Box 216 – 715 Seward Street
Dillingham, Alaska 99576
Phone: (907) 842-2384 - Fax: (907) 842-4510

Curyung Tribal Council Cooperating Agency Technical Comments on the Pebble Project (POA-2017-00271) Preliminary Final EIS

Curyung Tribal Council's comments on cooperating agency meeting notes for meetings held on March 9-11, 2020

Return to Excerpt

DRAFT FOR DISCUSSION

Project Name: Pebble Project EIS
Date: March 9, 2020
Time: 8:30am-3pm
Location: The Megan Room, 6591 A Street, Anchorage
Subject: Cooperating Agency Technical Meetings, Day 1
Introduction: Safety, housekeeping, opening remarks

Attendees and Affiliation:	
AECOM and subcontractors	Bill Craig, Elizabeth Bella, Jessica Evans, Allison Payne, Dan Delaney, Sasha Forland, Wes Cornelison, Nancy Darigo, Cara Wright, Lindsey Flagstad, Arika Mercer, Tara Bellion, James Dietzmann
ACHP	No attendees
BSEE	John McCall
Curyung Tribal Council	Courtenay Carty, Peter Van Tuyn, Gayla Hoseth
EPA	Molly Vaughan, Matt LaCroix, Betsy McCracken, Cindi Godsey, Palmer Hough, Patty McGrath, Amy Jensen, Michael Kravitz, Joe Ebersole
LPB (Jade North)	Bob Loeffler
Nondalton Tribal Council (represented by NARF)	Megan Condon, Bruno Ridolfi, Wes Furlong
NPS	Buck Mangipane, Brooke Merrill, Kerensa King, Sharon Kim, Paul Berger
State of Alaska (SoA)	Kyle Moselle, Ron Benkert, Lee McKinley, Lee Borden, Gary Mendivil, Josh Brekken, Ed Weiss
USACE	Shane McCoy, Katie McCafferty, Sheila Newman, Heather Markway, Bryan Herczeg, Melanie Collyer
USCG	David Seris, Jim Moore
USFWS	Douglass Cooper
PHMSA	Robert Guisinger

Action Items

Topic	Actions
General	USACE to send summary of changes from DEIS to PFEIS to CAs (done via email in the morning).
Wetlands/Water Quality	AECOM to look at the characterization of climate change trends between Sections 3.16 and 3.22.
Wetlands	AECOM to discuss with USACE about how to characterize wetlands impacts from groundwater drawdown in the cumulative effects expansion scenario.
Fish	AECOM to clarify the use of different fish stream datasets in the document.
Fish/Wetlands	AECOM will look at the baseline data for riffle and pools and use consistently through sections or give explanation of why consistent data were not used.
Wetlands	AECOM will review the discussion of intensity/magnitude in context in the wetlands section.
Fish	AECOM will look at the discussions of the four factors in the fish section to make sure the appropriate language is used.
Wetlands	AECOM will check the language in the wetlands section and make sure it is clear how the impacts were determined.
Wetlands	AECOM will carefully consider the language used in wetlands fragmentation; clearly define and clarify methods.
Wetlands	EPA will provide references about wetlands fragmentation.
Vegetation/Wetlands	AECOM will check language about fugitive dust to make sure methods are explained accurately.

Commented [Curyung1]: Curyung Tribal Council submits these comments and redlines on the March 9, 2020 Technical Meeting Notes, based on our recollection and our notes from the meeting.

Commented [Curyung2]: Curyung notes that these "action items" reflect only AECOM's take on what should be done. As discussed in the technical meetings, the expert agencies, including Curyung, requested other actions before the release of a Final EIS. These other actions are addressed elsewhere in this comment package.

DRAFT FOR DISCUSSION

Vegetation/Wetlands	NPS will provide references about dust deposition at Red Dog.
Wetlands	AECOM to consider how to discuss nutrient (or other parameter) changes in terms of water quality and how it may affect downstream wetlands and/or aquatic habitat.

Additional Notes

Project Alternatives, Process

- The USACE gave opening remarks, explaining the purpose of the meeting, which is to provide dialog to inform Cooperating Agency comments on the PFEIS.
- The USACE gave a brief description of the Applicant's Preferred Alternative and the other 3 action alternatives discussed in the PFEIS.
- The USACE will not have a preferred alternative in the FEIS, but there will be a Least Environmentally Damaging Practicable Alternative (LEDPA) identified in the Record of Decision (ROD).
- The USACE gave a brief overview of the EIS process. The PFEIS was sent out to Cooperating Agencies for review and comment, and 38 tribes (which is not required by NEPA).
- The USACE summarized the roles of the three federal agencies that will use the Joint ROD as a decision document (USACE, USCG, and BSEE). Curyung Tribal Council (Curyung) noted that USCG and BSEE were not in the room (note: USCG was on the phone, and BSEE joined later that morning).
- The LPB asked about the practicability of Alternatives 2 and 3 since there are~~is~~ no landowner agreements. The USACE responded that NEPA works under a different framework than the LEDPA and so those alternatives are still analyzed in the PFEIS, stating that dealing with property owner issues "will come later."
- ADNR requested to go over the changes from the DEIS to the PFEIS to be able to focus review. USACE agreed to send overview of changes to CAs. AECOM also pointed reviewers to the list of changes in the Executive Summary and Chapter 5.
- ADEC noted that they couldn't find changes in the document corresponding to their comments in the Comment Analysis Report (CAR, Appendix D of the document and the USACE comment response spreadsheet), and stated that some changes from the DEIS to the PFEIS that ADEC thought that USACE was going to do don't appear to have been made.
- USACE noted that CAs can find changes from DEIS to PFEIS summarized in the PFEIS and asked that CAs re-send the issues the CAs think USACE missed.
- Curyung noted that the Corps has not provided ~~thirty days is not~~ sufficient time to review the PFEIS for changes. It would have been good to get a red-lined version to see changes easier.
- Curyung is concerned that PLP submitted project changes without public input. Changes to the project since the DEIS are large and meaningful, and you should do another public review of the draft EIS. The USACE responded that the process is iterative, and if the changes reduce impacts they don't typically solicit comment. Curyung said that the stream impacts increased. AECOM responded that that was a factor of more refined data quality.
- EPA: We will participate as best we can given the time allowed. We see multiple challenges given the substantial project changes and the PFEIS analysis. As one example, there is not a consistent representation of resources throughout the PFEIS, which is confusing.
- The USACE clarified that the FEIS will be released in mid-2020 and the ROD will be signed at least 30 days after the FEIS.

General Topics

- Sampling frequencies/sampling extent: EPA had questions about the quality of the sampling data and the ability to make decisions based on it. Specific discussion on fish and water quality would be under the fish discussion on Tuesday and Wednesday.
- Uncertainties: EPA noted that having more information (like on stream quality data) would help reduce uncertainties. There are several years of data with varying spatial extents. There could be more discussion about that in the sections to help reviewers understand exactly what and how was analyzed. AECOM responded that some data has been moved to appendices. Asked for specific to determine the best way to address this concern.

Commented [Curyung3]: Curyung notes that the poor presentation of changes to the PFEIS from the DEIS makes review impossible. Appendix D, containing the response to comments, fails to include information about the source of each statement of concern. Curyung's name does not appear once in the PFEIS Appendix D, leading us to believe that none of the Tribe's comments have been addressed in the PFEIS. Curyung suggests specific changes to Appendix D in our technical comments attached in this package.

Commented [Curyung4]: This is one example of a non-sequitur response to a cooperating agency comment; the fact is that even under the Corps' artificially and in our view improperly limited scope of impact review, the impacts to streams, for example, increased by ~25% between the Draft EIS and the PFEIS.

DRAFT FOR DISCUSSION

- Standard stream network data: USACE noted that there was an effort to make the stream figures not too busy and asked specifically what could be done better. EPA expressed concern that there was not a standard stream network that was applied to all figures. Some reviewers were worried that if data were not shown in a figure that it might not be considered in the analysis. If different datasets were used for different resources, the request by EPA was to explain why.
- Monitoring plans: The ADF&G noted that a lot of monitoring takes place in the state process and not the federal process, but it would be nice to have something from the applicant that says what they are planning to do. ADF&G noted that the concept-level approach from PLP doesn't give the CAs much to go on and "highly recommend" more detail on monitoring plans. USACE added that the level of information needed for the federal process is very different that what is needed for the state process. The reminded everyone that there will be a rigorous state permitting process where there will be more detailed information. The further away from federal authority, the less information USACE requires for NEPA. Curyung repeated its objection to this limited scope of impact review.
- EPA asked if the USACE will require monitoring in the 404 process. USACE responded it will be in factual determinations in the special conditions in the LEDPA and the process hasn't gotten there yet.
- ADF&G recommends that the USACE informs the State as soon as they know what they will require for monitoring. USACE said there is a lot of monitoring required for compensatory mitigation, but things like wildlife monitoring are further away from authorities but are committed to by applicant.
- ADF&G noted that there is a perception that the analysis for the three action alternatives wasn't as good as it was for the Applicant's Proposed Alternative (APA). For instance impacts to Amakdedori are detailed but not Diamond Point. That is problematic because it is hard to make comparisons. ADF&G noted that the lack of detail makes it hard to compare alternatives.
- Curyung pointed out that the beneficial impacts in the EIS are well-laid out but not the adverse effects, and that can show a skewed analysis.
- Curyung asked about the National Historic Preservation Act Section 106 process and if that information will be used in the EIS. USACE responded that they are parallel processes, but the Section 106 information will inform some of the EIS analyses. The Programmatic Agreement will be an appendix to the FEIS.
- Curyung questioned the analysis focusing on the project footprint. There will be big impacts downstream, especially if there is a spill. The USACE responded that the analysis considers the footprint of the project, because that is where the federal authority is. Curyung repeated its objection to this limited scope of impact review.
- Curyung brought up that the discussion keeps referencing 'the reader' but the document is being written for decision makers, and so it should be focused on adding the information they need, not the public.

Climate Change

- AECOM summarized the ways that climate change is addressed in document in three ways 1) effects of climate change on project infrastructure, 2) project-related greenhouse gas emissions, and 3) effects of climate change on the environment. That is lined out in Sections 3.1 (analysis framework) and 4.1 (section by section summary of how climate change was discussed). Each resource topic addressed climate change in individual sections as appropriate.
- EPA noted that the climate change discussions didn't seem to match across the resources. Specifically 3.16 said there were no trends in precipitation, but then in wetlands section it does talk about that trend. AECOM said they would review characterization of climate change trends in these two sections.
- Additional discussion with SMEs to take place in subsequent meeting dates by specific topic.

Alternatives

- USACE said there was a request that about vessel routes to and from Amakdedori be included in the EIS. USACE notes that they have asked for that information and it was received in RFI 163. It will be included in the FEIS. It also shows general vessel traffic for baseline.

DRAFT FOR DISCUSSION

Expansion Scenario

- ~~There was a question~~Alaska DNR asked ~~about~~ if there would be other USACE reviews if the mine expands and how will NEPA work with that. USACE said yes, if there are additional impacts to waters of the US and navigable waters, there would be a new permit process. USACE said expansion scenario is part of cumulative effects discussion and as such it will not inform our choice of LEDPA or the Public Interest Review. AECOM added that that is stated in section 4.1.
- ADF&G noted that if the mine is expanded there would be duplicate facilities and asked how that is considered in the USACE decisions. USACE responded that they still have to go through the evaluation process and the LEDPA. If the applicant does expand, they will submit new application. The cumulative effects analysis is not considered when looking at the LEDPA, only the action alternatives.
- EPA asked about the pipeline under the expanded mine scenario. USACE responded that the natural gas pipeline would be in the same place but under the road there would be a concentrate pipeline.
- EPA asked if dewatering was considered in Section 4.24 under cumulative effects. AECOM said it is in there, maybe even a figure in 4.17 or K4.17. In the wetlands section they quantified the dewatering for the alternatives, but not the cumulative impact. That is because there is no project-specific wetlands data for that area. AECOM will discuss with the USACE and consider quantifying drawdown effects on wetlands in the expansion scenario. EPA brought up that consistent data sets throughout the document would be helpful, if some sections are using NWI and others use something higher quality. If different data are used it should be explained.

Wetlands

- Methodologies: EPA noted that there is no explanation of what stream network was used to analyze wetlands and fish, and so there is no way to tell if better data could be used or if all streams were accounted for. AECOM responded that the data used was more accurate than the NHD data and is a derived product from wetlands mapping with consistent acreage. EPA followed up saying that that additional discussion should be in the document or pointing to the appendix where it is discussed. AECOM responded that are different data sets. For example, for fish the data streams use data from observations. EPA added that they should identify streams that were not sampled and explain why. AECOM agreed to look into that clarification.
- Qualitative functional analysis. EPA stated that there does not appear to be a true functional assessment of wetlands, including their functions and values and which wetlands are regionally important and why. Where is discussion of site-specific information to back up the use of regionally important label on wetlands? AECOM feels this has been incorporated in 3.22 and 4.22. EPA said they would like to see more information presented in terms of how those choices were made; why those functions. In particular at the mine site, there was functional data collected. There was no discussion of why site-specific data were not used. AECOM responded that there is no reference dataset available for this area. They used NRCS functions because it presented a standardized treatment. EPA suggested using the site-specific data, and explain what was used better.
- EPA asked about the regionally important wetlands data, and how it was decided what wetlands were determined regionally important. AECOM responded that it was a synthesis based on comments received from scoping, then they developed a framework for analysis. It is also meant to accommodate special aquatic sites. EPA questioned how that framework was developed and the interpretation. They recommend the document explain what is important, what is more important, and why. AECOM stated that the "regionally important" label does not mean other wetlands are not important too. EPA questioned the use of this label and stated that some wetlands are culturally important also, i.e., due to plants, and the PFEIS does not address that.
- Curyung clarified that all wetlands are important to them. Traditional Ecological Knowledge tells us that wetlands are part of the interconnected whole.~~Everything is connected.~~ Any disruption has a significant impact. Disruption of some impacts the whole and this doesn't seem to be adequately acknowledged in the PFEIS. When asked where they go to traditionally harvest, they will not be forthcoming with that

DRAFT FOR DISCUSSION

information because, ~~this is not information to share with state and federal agencies~~Curyung noted, local people are hesitant to share traditional harvest information in general. When being asked (through research means such as TEK interviews and ethnographic methodologies), folks have hard time providing details to anthropologists and federal agencies and project proponents. Culturally, you are humble and do not boast. From a resource security standpoint you do not share your stockpile with those not in your survival group. In addition, research fatigue is prevalent and frustrating to describe something as important as way of life. The EIS basically talks about the use of the landscape over the last few decades of data, but our people have been here for a millennia and the EIS process minimizes that. ~~-~~ They ask that the group is careful when making statements about what is important to the people in the region.

- Culturally important plants: EPA asked about the possibility to attribute wetlands with culturally important plants from known vegetation data (what plants grow in what wetlands); same comment with riffle pools. EPA discussed how this can't be determined with stream data, but could possibly be determined with wetlands data. AECOM noted that the riffle pools were not determined because the data do not exist for that area. Such inclusion of information would be very high level, so would not necessary be accurate enough to include in a table. AECOM will think about how to clarify the discussion in wetlands and fish regarding riffle pools.
- Severity and magnitude: EPA had a question about how the magnitude is discussed in the PFEIS; in the case of wetlands and dewatering they believe it is not discussed adequately. PFEIS has confusing discussion on wetlands impacts. Duration and permanence of impact are addressed, but magnitude and intensity are not. This means that conclusion that there will be no impact to fish without this depth isn't well supported. There was inadequate identification of what the results of the assessment of magnitude was, and there are no conclusions. AECOM responded that the framework is described in Section 4.1 and each resource applied the four factors of analysis in a NEPA context. There are no conclusion categories. The data is presented in each section and quantified to the extent possible. The magnitude/intensity are often presented as acres for a wetland resource The context of those data is in the description of what magnitude/intensity means for that resource. For wetlands, the magnitude is summarized by acres. EPA added that the final line is not drawn; EPA described that some sections explain the four factors better than others. For example, the fish sections includes more specific language; EPA provided an example and asked if this statement was conclusory rather than an assessment of impacts. AECOM will look at language in the wetlands section for magnitude/intensity, and at the four factors assessments in the fish section. AECOM noted that task is to focus on impacts from placement of fill material into waters of the US, so our primary focus is on that aspect of impacts and less the farther away you get from that.
- Curyung: That scope is too limited as it misses so many impacts. If you insist on sticking with it, you must acknowledge the limitations – you cannot then opine on overall impacts to fish as you did in PFEIS, but only on the impact of fill on fish. These are far different things and you need to be very clear that your limited scope does not allow you to come to conclusions about impact of Pebble on fish in an overall sense. AECOM: Fair points. We will be clear what we are saying and what we are not saying.
- EPA asked if dewatering is a direct or indirect impact. AECOM responded that it is direct. EPA asked about the drawdown of 3 feet, and why that is not discussed. AECOM responded that it has to do with the sensitivity of the model. Drawdowns in those small changes (three feet) are not picked up in the model. With seasonal fluctuations, this is appropriate. EPA noted that if the drawdown is going to be maintained at 3 feet, that could result in a loss of wetlands function, not just a diminishment. AECOM clarified that the impacts were determined by the type of wetland, not the drawdown. AECOM will check the language in the wetlands section and make sure it is clear how the impacts were determined. AECOM added that the groundwater model information is discussed in RFI 109o.
- Fragmentation: AECOM noted the method developed, and what are not being considered fragmented in the PFEIS. EPA noted that it would be helpful to have a better definition of fragmentation and how it is discussed and analyzed. Hydrologic connectivity is only one element of fragmentation so if that is all that is used it should be clarified. USACE noted that they tried to stay as quantifiable as possible, and stay within authority. EPA said they can point to some literature on ways fragmentation is addressed, but there is a lot of literature out there about fragmentation from roads. It's not clear if those wetlands would be

DRAFT FOR DISCUSSION

considered fragmented in this analysis. AECOM will review language in the wetlands section to be specific about what fragmentation definition and analysis means in this EIS, and will include language about other fragmentation definitions from EPA literature and be clear that this document does not include expanded/other definitions.

Fugitive Dust

- AECOM gave a brief overview of the analysis of fugitive dust as it applies to wetlands, highlighting that the model is based on projected depositional rates and utilizes a 330 ft buffer around the project footprint was utilized for assessing impacts to wetlands. Indicated the dust deposition model suggest that there is limited amounts of dust deposited outside of the 330 ft buffer and does not justify expanding the boundary past 330 ft.
- EPA suggested that the 330 ft boundary may not align with the air dispersion model which should be incorporated into the wetlands analysis. EPA stated the 330' impact assumption may not reflect actual conditions on the ground. EPA suggested that the dust impact analysis area should be informed by the dispersion model and expanded as needed, referencing Red Dog Mine as an example of reaching areas far from the Mine Site. NPS stated that impacts could go on for much longer duration and scope than analyzed, especially to moss, lichens, caribou, groundwater leaching, etc. EPA agrees with NPS.
- AECOM notes that Red Dog Mine had an issue with concentrate dust shipped in open containers (the applicant is not proposing open containers; this practice was discontinued at Red Dog) and is not a good proxy. AECOM also notes that this issue has been carefully reviewed and is informed by the best available science which suggest that the 330 ft buffer is adequate, incorporating literature previously provided by CAs.
- Curyung asked for clarification regarding whether impacts related to fugitive dust are being deferred to the state permits or under USACE authority and suggested that this distinction be made very clear in the EIS. The USACE clarified that dust is considered a secondary indirect impact but state permitting will require more detailed and specific information to look at the issue.
- EPA suggested that the dust analysis should include a quantification of the amount of road dust generated and NPS expressed concerns regarding the impact of metals in dust deposited resulting in impacts to other resources, such as groundwater.
- AECOM clarified that dust dispersion modeling, including the mass of dust, was performed for the mine site and incorporated into the analysis of the EIS across several sections. AECOM also indicated that the 330 ft buffer was applied for wetland analysis only and that impacts to other resources, such as water and soil, were examined based off the dispersion model and not limited to a buffer.

Water Chemistry and Wetlands

- NPS raised concerns that direct discharges of effluent water into streams may result in large impacts to wetlands suggesting that changes in water chemistry (various parameters) as a result of effluent discharge would adversely impact wetlands.
- AECOM indicated that the EIS examines impacts to water quality and hydrology and that it is not clear how effluent discharge would impact wetlands. AECOM notes that all discharge would be expected to meet the applicable state water quality criteria prior to discharge.
- EPA clarifies that although effluent may meet water quality criteria, alterations of water chemistry could still result in impacts to wetlands. According to EPA, the question is whether the project alters pre-project conditions on the landscape, and how it does so. There is no analysis of this in PFEIS. Would discharge be re-mineralized to match receiving water for example? EPA suggest that they have seen analysis of water chemistry alterations handled in different ways in different EISs and notes that this discussion could be held during water quality portion of the technical meetings. EPA also asked what are the downstream impacts of habitat degradation? How many miles downstream are impacted by loss of subsidies from upstream habitat that no longer serves all or part of its function? AECOM: See 4.24, but that is not quantified. EPA: You address indirect impacts from water, dust and fragmentation, but not habitat degradation from loss of headwater subsidies. AECOM: We will see what we can do to tie the models

DRAFT FOR DISCUSSION

together.

- NPS noted that they were not able to find information that quantifies how much downstream habitat would be degraded as a result of nutrient deficiencies in effluent discharged into the headwaters of stream habitat. NPS stated that the PFEIS also needs to address chemical mixture; the PFEIS cannot conclude no impact to human health without doing that. This is a dust and discharge issue for example.
- EPA said that if flow modeling examined flow contributions, it seems that it should be possible to model nutrient levels.
- AECOM indicated that this is something they will review. Additional discussion may take place under Water Quality topics on Tuesday.

DRAFT FOR DISCUSSION

Project Name: Pebble Project EIS
Date: March 10, 2020
Time: 8:30am-5pm
Location: The Megan Room, 6591 A Street, Anchorage
Subject: Cooperating Agency Technical Meetings, Day 2
Introduction: Safety, housekeeping, opening remarks, ground rules

Attendees and Affiliation:	
AECOM and subcontractors	Bill Craig, Elizabeth Bella, Jim Munter, Jessica Evans, Allison Payne, Dan Delaney, Sasha Forland, Wes Cornelison, Nancy Darigo, Cara Wright, Arika Mercer, Tara Bellion, James Dietzmann, Mike Gray, Richard Henry, Sagar Thakali, Tom Damiana
ACHP	No attendees
BSEE	John McCall
Curyung Tribal Council	Courtenay Carty, Peter Van Tuyn, Gayla Hoseth
EPA	Molly Vaughan, Matt LaCroix, Betsy McCracken, Cindi Godsey, Patty McGrath, Amy Jensen, Michael Kravitz, Chris Eckley, Barbara Butler, Jay McAlpine, Karl Pepple
LPB (Jade North)	Bob Loeffler
Nondalton Tribal Council (represented by NARF)	Bruno Ridolfi, Wes Furlong
NPS	Kerensa King, Sharon Kim, Paul Berger, Krista Bartz, Brooke Merrill
State of Alaska (SoA)	Ron Benkert, Lee McKinley, Lee Borden, Gary Mendivil, Josh Brekken, Ed Weiss, John Clarke, Cathe Heroy
USACE	Shane McCoy, Katie McCafferty, Sheila Newman, Heather Markway, Bryan Herczeg, Melanie Collyer, Ashley Kraetsch
USCG	David Seris, Jim Moore
USFWS	Douglass Cooper, Angela Matz, Catherine Yeargin, Veronica Varela
PHMSA	Robert Guisinger

Action Items	
Topic	**Actions**
	AECOM to re-examine the language pertaining to the PDO and make sure it is clear.
	AECOM to examine the 95th percentile and compare it to first flush data and to review the temperature corrections in geochemical source data and if needed, update the uncertainty discussion.
	AECOM to add more discussion of chemistry of toxicity testing sample test waters to text.
	AECOM will update Table 4.15-1 to clarify that dam safety factors are preliminary.
	AECOM to review language in the dust section of the EIS for clarity.
	AECOM to add discussion of methylmercury to spills section.

Additional Notes

Surface Water

- NPS questioned the discussion of Pacific Decadal Oscillation (PDO), as it is not supported in recent literature, and recommended use of other models and to look at more recent literature. AECOM acknowledged they have seen the recent literature NPS cites, but noted that PDO is established science, and is not a model. AECOM will re-examine EIS language to make it clear that when PDO is mentioned, data is from other sources/models, not from PDO itself (action item).

Groundwater

- NPS recommended including further information on monitoring plan for groundwater cone of depression.

Commented [Curyung1]: Curyung Tribal Council submits these comments and redlines on the March 10, 2020 Technical Meeting Notes, based on our recollection and our notes from the meeting.

Commented [Curyung2]: Curyung notes that these "action items" reflect only AECOM's take on what should be done. As discussed in the technical meetings, the expert agencies, including Curyung, requested other actions before the release of a Final EIS. These other actions are addressed elsewhere in this comment package.

DRAFT FOR DISCUSSION

AECOM gave overview of the issue and the Applicant's plan, informed the CAs that it is only conceptual-level at this point, and noted that details of monitoring program would be worked out with DNR. DEC asked if there is an enforcement mechanism in place in such plans? DNR notes that enforcement is not that strong and that USACE enforcement through its permit is much better. AECOM noted that Alaska has enforcement through the Water Use Act. Curyung stated that deferral of details of monitoring plan is inappropriate because it implies that details of groundwater are not important. AECOM noted that monitoring plans would be developed once the area is dewatered, as the reality of groundwater flow will not be completely known until the area is dewatered. Lake and ~~Penninsula~~Peninsula Borough noted that it's like an adaptive management plan, the details would be worked out as the project is developed. FWS suggested providing examples of other monitoring plans, or if there are no examples, then provide hypothesized examples. EPA stated they had concerns about the lack of detail for monitoring plans, noted that conceptual plans are challenging to base review on, and asked that as much information as possible be included in the EIS. EPA noted that it is not uncommon to have conceptual plans only, but it's helpful to have as much detail as possible, and that the EIS should note regulatory authority for the plans. Curyung expressed concerns about whether this could be achieved, stating that is the project would be unprecedented in scale. Curyung stated that USACE cannot call this a robust process with so many details deferred to a later process. For example the Alaska Dam Safety Program does not engage public at all, and there will be little opportunity for holistic review later. USACE process is supposed to be robust in that way and it is not, so please do not suggest that it is.

Water Quality

- EPA noted many uncertainties in the chemical release rates and questioned the non-conservative chemical release rates used in the water quality modeling regarding exclusion of the first flush data, noting that it could underestimate release of metals. EPA will address this issue more in written comments, but lab tests do not appear to be conservative. For example, lab tests done at 20 degree c and then the results are universally multiplied by .2 to account for colder conditions on-site. This is too general as metals won't decrease at similar rates in lower temps, and some may even increase. AECOM will compare first flush with 95th percentile values and review uncertainty discussion. EPA also noted that temperature corrections data may not be appropriate, providing specifics on laboratory methods and equations applied. AECOM will review this. EPA agrees that more discussion in the EIS would be good, but notes that EIS may need to show how uncertainties might impact conclusions. Curyung said they have the same comment as the EPA and questioned the reliability of conclusions, and asked to please be clear about what the EIS is doing/not doing.

- EPA requested discussion of the impact of sulfate releases on downstream methylmercury production. EPA expressed several points about how this topic was addressed in the EIS. AECOM noted that they will review the EPA comments on methyl mercury. Later in the meeting NPS brought this up again, and asked, regarding levels of dissolved oxygen, if any of the samples were from wetlands, as that is prime area for anoxic conditions. NPS noted there are data gaps in sampling locations given PLP's alternative. See 3.18, with 2005 and 2007 data on a route that is no longer PLP's approach. AECOM to review, but does not anticipate further field work.

- USFWS noted that there was no mention of potential increase in mercury methylation in the spills section. AECOM to address this in the spills section (action item).

- EPA questioned the representativeness of samples used for toxicity testing as a basis for predicting impacts of concentrate, tailings, and process water spills in the spills chapter. EPA: please include rationales as to why toxicity tests are representative of the bigger picture, as we think that may not be the case. AECOM will add more discussion of uncertainty to the text.

- EPA commented on the exclusion of erosional processes on the impacts of fugitive dust on water quality, noting that a lake was used as a surrogate for a stream system, and that the mobility of dust could be underestimated. AECOM noted that a conservative approach was taken. AECOM will review language in the dust section for clarity.

Return to Excerpt

DRAFT FOR DISCUSSION

- EPA mentioned evaluating potential interactions among stressors related to the mine (e.g., considering how flow changes will affect sedimentation). AECOM and EPA agreed to postpone discussion until Wednesday under the fish topics.

- NPS noted that they will recommend in their formal comments clarifications or further summary of sources in order to make the field studies and analysis more accessible to the public reader, and also recommended a series of minor changes to the analysis to better incorporate best available science. AECOM will review their specific comments on PFEIS when received.

- NPS recommended a correction to predicted increase of air temperature based on the 4th National Climate Assessment, noting that the temperature change prediction is dependent upon the particular emissions scenario, and ranged from a 3-5 degree increase. AECOM will review their comments.

- NPS noted surface water sample locations from Lake Iliamna are not within the PFEIS applicant's preferred alternative ferry route and recommended acknowledging this as a data gap. AECOM will review.

- EPA asked if additional evaluations regarding water treatment are planned to occur before the FEIS or as possible mitigations to reduce uncertainties, and inquired as to level of certainty for EIS. AECOM noted that nothing else planned before FEIS. EPA noted that water treatment has not shown to be viable at the proposed Pebble scale. The EPA asked the USACE if they are comfortable moving forward with FEIS with this technical uncertainty about water treatment? USACE replied yes. EPA noted that the water pond would allow for storage up to three years to allow for changes to water treatment, and stated that EIS should evaluate whether changes would be possible within three years. USACE said to table the discussion. EPA noted that if the FEIS moves forward with uncertainties, the document should present potential consequences if the treatment is not attainable. EPA asked how USACE would address changes to the WTP approach that may come in later work? AECOM: We are comfortable moving forward despite the uncertainty. Let's table the WTP change discussion. EPA: If you are moving forward to FEIS, then review consequences if approaches in PFEIS are not attainable. ~~Fish and Game~~ ADF&G asked if water is stored for three years while PLP makes changes to its WTP, how to supply missing streamflow input for those three years? AECOM: no answer.

- EPA noted that there could be a potential gap regarding groundwater model parameters. AECOM noted that groundwater/surface water interactions were considered.

- EPA asked about habitat conditioning from effluent from water treatment; temperature and dissolved oxygen are considered, also consider ion concentration? AECOM to consider adding as mitigation.

- EPA noted that they will have more comments on water topics to come; still a concern with water treatment; EPA may want another meeting.

- Curyung noted that they appreciate the changes from DEIS to PFEIS and that new models are complex and they need more time to allow experts to review; they are very uncomfortable with water treatment uncertainty which would be one of the reasons for revised/supplemental EIS; new numbers in water balance have increased from the DEIS and leads to higher risk; unprecedented volumes of water to treat; environment so critically connected to that water volume; don't understand lack of detail with respect to the uncertainties, the EIS should better explain the uncertainties and risks; expanded development scenario would be 53 million gallons/day; that PLP has not committed to not using cyanide under the expanded mine scenario is another red flag; they have serious concerns; EIS should be clear about limitations; tribe has to live with consequences of uncertainty.

Air quality

- EPA felt that there are still some incorrect emission factors. AECOM to review.

- EPA mentioned the proposal for the ambient air boundary and recommended additional documentation.

DRAFT FOR DISCUSSION

They noted the application would have a proposal for boundary and they suggest including the proposal in an appendix. EPA also noted that the proposed boundary would have to follow new EPA regs and should be clearly identified. AECOM noted that the air boundary would be determined by the state. AECOM to review.

- EPA discussed NO2 impacts at the Dimond Point Port site alternative, stating that the analysis provided in the PFEIS shows possibility of impacts at Dimond Point port alternative potentially above standards. EPA noted that the use of a conservative model alleviates some concern; EPA suggests modeling Diamond Point port where there is data. AECOM to discuss.

- EPA had questions about a source cited for aircraft emissions. AECOM noted that the source is specific to tiered engines and is commonly used in NEPA.

Spills

USFWS raised concerns that there was no discussion of the potential for Mercury Methylation in the spills section of the PFEIS. AECOM indicated that this discussion could be added.

- EPA raised concerns regarding the representativeness of water samples used for toxicity testing as a basis for predicting impacts in spill scenarios. EPA noted that the sample appears to be based off the non-gold tailings and would like additional rationale for the use of this water sample. AECOM indicated that the laboratory sample was from non-gold plant tailings and was meant to represent worst case scenario therefore was a conservative spill scenario proxy sample. EPA indicated that they believe the spills section should include text describing the samples.

- ADNR indicated that they had questions and concerns pertaining pipeline freezing protection and would be submitting more comments formally. AECOM noted where information pertaining to pipeline freeze protection (burial) is located in the EIS.

- NPS recommended inclusion of information pertaining to species and biological community assessment areas located downstream of the Lower Cook Inlet for the affected environment analysis for spills. AECOM requested further information and clarification from NPS regarding species for inclusion. NPS indicated that their experts would send information to AECOM for review.

- NPS expressed that a mass balance analysis should be incorporated into the EIS. AECOM clarified that mass balance was examined and is discussed in section 4.18 of the EIS. NPS also noted concerns regarding environmental consequences following multiple stressors in the spills section and suggested that there are additional references they could provide pertaining to impacts on coastal regions.

Tailings Dam Stability and Failure

- EPA asked for clarification on discussions of factors of safety in K4.27 vs K4.15, and whether statements pertaining to the factor of safety in the EIS were still accurate. AECOM clarified that in sections 4.15 and K4.15 that safety factors are presented for specific conditions and based on conceptual design only. AECOM indicated that statements in the EIS pertaining to the factor of safety are accurate and include discussions of uncertainty as applicable. EPA noted AECOM may consider editing table 4.15-1 to clarify that factors of safety are preliminary, AECOM agrees.

- AECOM reviewed an EPA comment pertaining to additional studies and information regarding the tailings dam design and whether there are design changes that could reduce uncertainties. AECOM indicates that no additional studies are planned prior to release of the FEIS but studies would happen at a later time for State of Alaska dam permitting. AECOM noted that design changes would likely be minor changes that would be developed as more information becomes available, noting that this iterative process is a standard industry approach to dam design. EPA noted concerns regarding tailings uncertainties such as whether tailings segregate as expected. AECOM noted that the design engineers suggest that tailings should segregate and that bench scale testing would test the segregation abilities as part of final design/State of Alaska dam permitting. EPA suggest that it may be wise to consider cycloning of tailings into the analysis. AECOM indicates they will consider it. EPA asked if USACE can require bench testing to confirm the tailings segregation. AECOM: Bench testing can be done and will be

DRAFT FOR DISCUSSION

done in the future. EPA: There is significant uncertainty here, and that uncertainty should be elevated in the NEPA analysis. AECOM: That does not mean that we need to do a full breach analysis as it is so unlikely.

- Curyung noted uncertainty pertaining to the stability of the tailings dam and the safety of the dam. Curyung indicated that they are uncomfortable with the level of uncertainty pertaining to dam stability and the analysis of potential failures. USACE clarified that dam failure scenarios were analyzed, but not worst case scenario failures that require lengthy causal chains. Curyung notes lack of confidence in dam design, citing an AECOM tech memo (AECOM 2019n) which highlighted concerns of and raised the possibility of embankment failure. AECOM: Very unlikely to happen. Additional design work will be done. We are comfortable with our approach.

- AECOM addressed a question from the EPA as to whether additional information on TSF design would impact the conclusions of the Failure Modes Effects Analysis (FMEA) workshop held in October 2018. EPA cited the ACEOM 2019n memo that says tailings may fail and noted that a full failure analysis is a good idea given the concept-level design and uncertainties around segregation. EPA elaborated that the comment pertains to remaining uncertainty and suggested that failure scenarios for the bulk TSF should be analyzed. AECOM indicated that FMEA workshop analysis was based on the available conceptual design and that expansion of preliminary work would likely not change the conclusions of the FMEA. EPA raised questions regarding why the FMEA did not include assignment of confidence levels to the risk ratings. AECOM noted that confidence levels were not addressed for individual failure modes in the FMEA due to the conceptual nature of the design. AECOM also noted that the FMEA was an EIS-Phase FMEA and was not intended to be a full risk assessment as would be required by the State dam safety program.

- Curyung raised additional concerns regarding dam safety and suggested that USACE should require more than just a conceptual design, noting that the analysis and design is not a robust approach to addressing and analyzing the risks. Curyung raised further concerns regarding uncertainties in the dam design. AECOM clarified that the uncertainty pertains to detailed aspects of dam design, not the design itself, and that uncertainty would continue to be reduced as design advances. There was discussion across the room as to when it is typical for dam design to be evaluated in more detail. USACE noted that they do not require the same level of detailed dam design as the State of Alaska, as dam safety is not under the Corps authority, but rather that of the State.

- EPA stated it remains concerned with the lack of a failure analysis and their concern is compounded by the fact that the FMEA did not include confidence levels. EPA again asked about the lack of confidence levels in the FMEA and asks AECOM to address FMEA confidence levels. AECOM noted that confidence levels are addressed in the FMEA final report. EPA suggested that it sounds like there are low confidence levels and the analysis should go a step further, however AECOM indicated that this would be part of the dam safety review and not necessary for the EIS. Lake and Peninsula Borough asked why not at least identify some of the problems here?

- Curyung questioned what the downside to doing full dam failure analysis would be. Curyung asked what is that national interest in avoiding to do a full failure analysis in the face of so much interest in having it done from local people and experts? USACE indicated that the FMEA did not identify a mechanism for a complete catastrophic dam failure and such a failure was deemed to be extremely unlikely; also as per the USACE interpretation of NEPA guidance, they are not to analyze extremely unlikely events. Additionally, USACE noted that tailings dam safety is not within their regulatory authority. Curyung asked USACE to show a similar dam to Pebble that has worked. AECOM and USACE: no response. EPA asked if someone from the Alaska Dam Safety Program (ADSP) was available to answer some of these questions. Lake and Peninsula said should check with ADSP on this. FWS: agreed with these concerns and stated that when there are conflicting conclusions between the body of the PFEIS and the record documents, the public confidence in the analysis is undercut.

Oil and Diesel Spills

DRAFT FOR DISCUSSION

- NPS expressed concerns pertaining to the analysis of spill risks from tank barges and asked why were the specific scenarios chosen. NPS indicated that data used to evaluate tank barge spills used a different type of marine vessel than would be utilized in the Pebble Project. NPS stated that under the current analysis, it is hard to get a sense of the potential impacts and evaluate the choices that can be made between alternatives. USFWS commented as to why certain volume diesel spill scenarios were selected for analysis rather than others. USFWS suggest that there needs to be a better description in the EIS regarding what spill scenarios were evaluated and what they mean. AECOM to review the information regarding tank barge spills and spill scenarios.

DRAFT FOR DISCUSSION

Project Name: Pebble Project EIS
Date: March 11, 2020
Time: 8:30am-5pm
Location: The Megan Room, 6591 A Street, Anchorage
Subject: Cooperating Agency Technical Meetings, Day 3
Introduction: Safety, housekeeping, opening remarks, ground rules

Attendees and Affiliation:	
AECOM and subcontractors	Bill Craig, Elizabeth Bella, Jessica Evans, Allison Payne, Dan Delaney, Sasha Forland, Wes Cornelison, Nancy Darigo, Cara Wright, Arika Mercer, Jonathan King, Jim Munter, Mark Allen, James Dietzmann, Kaley Volper, Andrew Fisher
ACHP	-
BSEE	John McCall
Curyung Tribal Council	Peter Van Tuyn, Courtenay Carty
EPA	Matt LaCroix, Betsy McCracken, Mike Kravitz, Amy Jensen, Patty McGrath, Joe Ebersole, Palmer Hough, Michelle Davis, Cindi Godsey
LPB (Jade North)	Bob Loeffler
Nondalton Tribal Council (represented by NARF)	Bruno Ridolfi, Ysabel Diaz, Monty Rogers
NPS	Sharon Kim, Kerensa King, Krista Bartz, Kelsey Griffin, Brooke Merrill, Rachel Mason
State of Alaska (SoA)	Kyle Moselle, Ron Benkert, Gary Mendivil, Josh Brekken, Lee McKinley, Lee Borden, Ed Weiss, Alyssa Miller, Robin Dublin
USACE	Shane McCoy, Katie McCafferty, Sheila Newman, Heather Markway, Bryan Herczog, Brandee Ketchum, Ashley Kraetsch
USCG	David Seris
USFWS	Douglass Cooper, Catherine Yeargan, Angela Matz, Kevin Foley
PHMSA	Dave Hassell

Action Items	
Topic	**Actions**
Fish	AECOM to consider quantification of dust from vehicle traffic.
Fish	AECOM to review NHD and wetlands stream mapping data layers.
	Curyung to send figure showing fish distribution/portfolio effect to USACE and AECOM.
Fish	NPS to send monitoring data regarding Newhalen River salmon escapement to USACE and AECOM.
Fish	Additional AECOM SMEs will review the source Wobus et al. 2015 as per streamflow data.
Fish	AECOM to clarify discussion of multiple stressors and potential synergistic effects on fish, including uncertainties.
Fish	AECOM to incorporate 2018-2019 Bristol Bay Commercial Fisheries Data into the EIS.
Fish	AECOM to clarify discussion of modeling and verify accuracy, including disclosure of uncertainties and model limitations.
Fish	Review the analysis of water quality impacts to salmon homing abilities.
Wildlife	AECOM to add discussion of historic shorebird colonies and marine mammal haul outs farther south in Cook Inlet.
Wildlife	NPS to send reports to USACE and AECOM on historic shorebird colonies and marine mammal haul outs farther south in Cook Inlet.
Wildlife	AECOM to revisit the disclosure of impacts pertaining to brown bears.

Commented [Curyung1]:

Curyung Tribal Council submits these comments and redlines on the March 11, 2020 Technical Meeting Notes, based on our recollection and our notes from the meeting.

Commented [Curyung2]:
Curyung notes that these "action items" reflect only AECOM's take on what should be done. As discussed in the technical meetings, the expert agencies, including Curyung, requested other actions before the release of a Final EIS. These other actions are addressed elsewhere in this comment package.

Commented [Curyung3]:
This figure is found in:

Sean R. Brennan, Daniel E. Schindler, Timothy J. Cline, Timothy E. Walsworth, Greg Buck, Diego P. Fernandez. **Shifting habitat mosaics and fish production across river basins**. *Science*, 2019; 364 (6442): 783 DOI: 10.1126/science.aav4313

Curyung has also attached this study to our comments on the Preliminary Final EIS.

DRAFT FOR DISCUSSION

Wildlife	AECOM to review daily vehicle traffic information in the EIS.
Wildlife	AECOM to add a description of the pipeline support berm proposed in Iliamna Lake to the EIS.
Wildlife	AECOM to review use of Koktuli for recreation float trips.

Additional Notes

Fish passage and preservation of fish passage after mine closure

- EPA stated it does not believe PFEIS conclusions that there will be a lack of long-term fish passage problems are supported by the evidence. The 2014 Bristol Bay Watershed Assessment (BBWA) concluded that this risk is real and is based on best available information. The PFEIS underestimates the likely impact of the road overall. AECOM noted that culverts would be designed as appropriate for fish populations. EPA requested information as to who maintains roads/culverts in post closure, stating that the quality of monitoring would likely decline and lead to failed culverts; acknowledged that there is low risk of culvert failure during active operations, but that the risk of culvert failure in post closure is not accounted for and that thus the EIS underestimates risk to fish. EPA also noted that crossings are abundant and that the EIS implies impacts only during construction; minor impacts at a large number of crossings can result in cumulative impacts that are not disclosed. Lake and Pen Borough noted that other EISs such as Red Dog and Pogo do not go into detail on culverts. EPA noted that science and NEPA advances and EISs get longer, so now it is appropriate to address issues. Lake and Pen agreed.

- Curyung indicates that NEPA ~~is~~ requires fact specific analysis, that this issue is important and we agree with EPA that the conclusions are not supported in the record.~~;~~ Tribes rely on salmon so it is appropriate to have high burden on salmon for this EIS; they are last remaining salmon-based culture in the world.

- ADFG notes that Red Dog road is state road that would be maintained, different situation with Pebble road as it is unknown as per maintenance after closure; some mitigation deemed unlikely in the EIS but the State would regulate to modern design standards so some of this mitigation is not unlikely; the State is encouraging bridges where possible.

- ADFG notes that it is best to design for fish passage even where fish are not documented; it's not that hard to do.

- Curyung agrees with ADFG – sampling is important for many reasons, not just for fish passage. USACE cannot understand the full impacts without it, and definitely cannot support conclusions in the PFEIS that there will be no measurable impact on fish populations, as the PFEIS concludes without sampling. EPA agrees and notes that downstream impacts can be quite significant. Such as direct, secondary, and cumulative impacts that are unjustifiably minimized in the PFEIS.

Production of dust from vehicle traffic

- EPA stated that the amount of dust produced would be high and an estimate of tons of dust produced per year should be made; USFWS agrees with comment and notes that the EIS needs more discussion. ADFG suggested also looking at impacts of potential mitigation, such as spray used and potential runoff. Coast Guard notes that fugitive dust impacts from runoff from bridges should be addressed. AECOM will consider quantification of dust from vehicle traffic.

Justification for the assumption that effects downstream of road crossings will only occur within 0.25 mi downstream

- AECOM stated that this area is where anticipated extent of potential effects would be expected, not including failures. USFWS noted that this is reasonable, but EIS need to address any new conclusions as pertaining to dust.

Recommend including a figure indicating tributaries that would be impacted directly by mine development.

Return to Excerpt

DRAFT FOR DISCUSSION

- AECOM noted that several figures in EIS show this, and asked what kind of figures are requested. NPS requested a single figure that shows all impacts with a clear indication of which tributaries would have permanent change. EPA noted that it would be valuable to have a combined network map showing where fish are/are not, similar to that in wetlands section. AECOM will review NHD and wetlands stream mapping data layers.
- AECOM noted that it has not been determined there are streams at the mine site that have not been surveyed for fish. AECOM is reviewing.
- There was additional discussion across various agencies noting the variability of fish presence in streams over time and the difficulty of obtaining accurate data. ADFG noted that it is best to design for fish passage even if the limited data doesn't reveal fish presence because at some time there may be fish.

Commented [Curyung4]: Awkward sentence. ADFG, and others, including Curyung, stated that there are streams that were not surveyed, and that some surveys that were undertaken were not scientifically sound, i.e. hastily done with a methodology not likely to capture accurate fish presence and use information.

Recommend bolstering or removing unsupported conclusion of lower quality/low use habitat.

- AECOM noted that they did not want to imply that it is low quality habitat, but lower quality compared to downstream habitat where there is abundance of fish. NPS noted that lack of fish doesn't equal poor quality habitat. EPA stated that EIS language comes across as saying habitats that would be directly impacted are of low quality; downstream habitats would also be altered by project from indirect effects; the EIS diminishes the importance of direct impacts and does a poor job of describing secondary impacts. NPS noted that cumulative effects are stated to be minor to moderate and that these impacts are not captured by cumulative effects table; cumulative effects analysis not adequate; cumulative effects impacts are just addressing past and present actions and RFFAs, but should instead address whole system. ~~Cuyung~~Curyung agrees that cumulative effects should not be considered minor to moderate, and that this conclusion cannot be justified with the limited scope which ~~of~~ USACE is applying to its review of the potential impacts of the permit application (a scope which ~~which~~ is intentionally focused on the direct impacts of the placement of fill in waters of the U.S., with less review of indirect, secondary and cumulative impacts resulting from the placement of fill in waters of the U.S.).

Recommend providing information about aquatic habitat and fish along transportation corridor roads.

- AECOM noted that this topic has already been discussed and asked what else agencies are looking for. NPS stated that there is missing information on smaller streams, and asked to make sure that information at road crossings is complete. NPS stated that PFEIS section 4.2 says that cumulative effects of the Applicant's Preferred Alternative are "minor to moderate," but the chart there doesn't capture the full indirect and cumulative impacts. ~~Cuyung~~Curyung showed a chart that shows the challenge to documenting fish presence (illustration of portfolio effect), noting that fish presence varies by year and the difficulty of accurately characterizing fish presence on those corridors. USACE asked Curyung to provide the illustration and supporting studies. ADFG agreed with statement; biology of fish in Iliamna drainage shows that fish presence varies over time.

Recommend adding Newhalen River salmon escapement data.

- AECOM noted that additional information was added, and asked what else could be added. NPS stated they would send monitoring data.

Recommend minor corrections to analysis of fish migration.

- NPS stated that they will email specific comments

Recommend that the instream flow model incorporate the projected changes to streamflow from the warming climate in this region. Sources provided.

- AECOM noted that climate variability data is included in the model in 4.16, and that the model fed habitat modeling. NPS and USFWS mentioned that the source Wobus et al. 2015 has a hydrological model for this exact site. The Wobus et al. 2015 provides for climate link to stream flow and water temperature. AECOM stated that some SMEs have reviewed that source, it is in their database, and other AECOM SMEs will review that source.
- EPA agrees and states that USACE's current models appear internally inconsistent. The models show total dewatering of streams during operations, and then doubling of streams and habitat post-closure.

Return to Excerpt

DRAFT FOR DISCUSSION

This analysis is too one-dimensional and does not reflect reality. ADFG agrees and says that what USACE/AECOM used might be a good tool, but it does not support your conclusions.

- Curyung reminds USACE and the CAs not to forget about the connection of streamflow impacts to people. What impacts the fish in turn impacts the people and the PFEIS needs to better address this.

Recommend including a comprehensive summary of impacts of the entire project to fish in the cumulative effects section.

- EPA stated that USACE needs to be very clear about what is known and not known in the PFEIS. The PFEIS says that the project is "unlikely to have measurable impacts" on fish, but there are limits to the evidence that supports this conclusion, including the severe limit in scope used by USACE, and USACE doesn't address those limitations. EPA noted a concern about synergistic interaction, and how impacts can amplify to produce secondary impacts; also requested more broad discussion of all impacts within cumulative effects as per multiple stressors issue; stated the need to combine impacts to wetlands, streams, and state potential to amplify impacts to fish. ADFG stated similar concerns as EPA. Curyung noted that if the EIS does not address cumulative sufficiently it would be impossible for decision makers to make their decision. AECOM will clarify discussion of multiple stressors and potential synergistic effects on fish, including uncertainties.

- NPS noted that EIS also needs to include discussion of discharge load; 4.18 mass loading discussion is insufficient. ~~Cuyung~~Curyung stated that there are 3 choices of direction when data is limited; 1 - ask the Applicant; 2 - wait for state permits; or 3 - identify limitations and don't make conclusions; with the narrow scope and speed of process the 3rd option is the only option. EPA stated a need to justify no measurable impact in cumulative effects analysis, and to describe uncertainty and how it pertains to conclusions.

Recommend bolstering or removing unsupported conclusion ~~of~~ that habitat loss will not have an impact on fish populations downstream.

- NPS stated that the statement that habitat is lower quality is not substantiated and that the analysis does not support that statement. EPA agreed with that and asked if it would be possible to conduct additional analysis to supplement current PHABSIM model analysis, and also look at synergistic impacts. For example, EPA noted that net gain or loss is evaluated on an annual basis, which is not representative of likely impacts. And increase in water discharge does not always equal increase in fish habitat; it is more complicated than that with more variables that are relevant. The model AECOM used looks to only some project-related changes. We can continue to talk about this. AECOM asked if there were any specific other models EPA would suggest. There was discussion of the idea of conceptual models and the extensive data set that could be analyzed to reach preliminary conclusions, but no specific other models were suggested. EPA also noted that difficult NEPA topics justify using multiple approaches, and provide examples from other projects. EPA also asked if habitat changes could be based on other variables and if project related changes could be quantified, noting that conclusions were reached based on discharge and velocity alone. Curyung also encouraged the EIS to look at human impacts as well.

Recommend bolstering or removing unsupported conclusion of no impacts to incubating eggs or alevins from impacts to groundwater temperature.

- AECOM noted that the fish analysis was based on the analysis of physical impacts; discharged water would meet state and federal water quality standards. NPS stated that the EIS needs evidence to support the conclusions, ie, the EIS needs data on groundwater temperature to support conclusions. EPA stated that just because water meets water quality standards does not mean there are no impacts; effluent temps do not match baseline and temperature changes can have an effect on eggs.; Ambient temperature of receiving water and groundwater is key to understanding impacts. What you are doing ~~there~~ is effectively a mixing zone of several miles long; there is temperature differential that would affect~~s~~ eggs in gravel; even though within range of variability does not support conclusion that there would be no effect. ADFG stated that the issue is not as simple as warm water makes early emergence which is good; issue needs a closer look. ADFG also noted that conclusions are not supported and that there are some contradictions; and that the Copper River study is not applicable. EPA stated that groundwater

amelioration is not applicable because groundwater supply would be cut off by project; there is a need to look at interrelationship of project changes. AECOM noted that there would still be groundwater recharge from north side and that the discharged warm water rises, and does not impact bottom of stream where eggs are. EPA questioned AECOM's conclusions that groundwater recharge would work this way and stated that the model does not support that conclusion. EPA also questioned impact on returning adults finding their way back and the impacts of temperature on returning adult salmon, noting that EIS needs to account for all life stages and the long-term. USFWS agrees with EPA and ADFG regarding the totality of impacts to be accounted for, including cumulative; notes that there are internal inconsistencies throughout document; when discussion is compartmentalized the overall consistency is sidelined; need to move broad conversation forward so a full picture of the impacts is analyzed.

Revisit the issue of incorporating the 2018-2019 Bristol Bay Commercial Fisheries Data into the EIS.

- AECOM agrees that it's time to add more recent data, and that it is simple to add and that all sections could be updated for Bristol Bay; one challenge is that the annual management report has not been published yet. ADFG noted that this has been a big issue in Bristol Bay and they will follow up regarding availability of document; it is usually available in April. AECOM will incorporate 2018-2019 Bristol Bay Commercial Fisheries Data into the EIS. Curyung also requested that the EIS address the fact that the Nushagak ~~chinook~~Chinook escapement was recently not met for first time in their memory; and also to please include most recent Mulchatna caribou herd data. Curyung noted that the data in the PFEIS shows a Mulchatna Caribou herd population twice what it is now and points out that this must be updated in the EIS.

Predicted habitat suitability under modified stream flows.

- EPA: the acreage estimates are not accurate. ADFG: miles of water are suitable for spawning, and in the same areas where AECOM says that only a few acres are suitable. So there are mixed standards and unsupported conclusions. AECOM may request assistance from R2 to address issues where there seems to be logic issues, and regarding changes in monthly vs daily surface flows and flow time series data; this could be a potential RFI. EPA asked if the EIS can address habitat losses not accounted for in PHABSIM modeling because the model does not capture resident fish loss in mine site, also doesn't capture 6.71 miles of habitat in NFK tributary. AECOM noted that the model also considers quality of habitat. EPA stated that habitat losses that are not accounted for should be noted. AECOM will clarify discussion of the modeling and verify accuracy, including disclosure of uncertainties and model limitations. NPS noted that the focus is on streamflow, but also need to include water quality, such as temperature, metals, etc. AECOM stated that water quality has been considered. EPA: the PFEIS is not addressing concerns of olfactory impacts to fish. EPA stated that EIS does not address imprinting juveniles and their ability to return to streams, noting that there would be alterations to water quality and that there is a very sensitive balance with the chemical signature of water. Curyung noted similar concerns with imprinting regarding copper levels, etc, from pyritic and bulk TSFs. ADFG agreed this needs to be addressed, as water chemistry would be changed all the way to the Bay. NPS stated that there is no mention of olfactory issues. USFWS noted that this was one example of a compartmentalization problem, noting the mixtures of contaminants and potential impacts on olfactory issues. AECOM will clarify discussion of multiple stressors and potential synergistic effects on fish, including uncertainties.

Provide additional data on cumulative impacts of environmental on marine wildlife stressors to bolster analysis of marine waters.

- NPS noted that there is no acknowledgement of historic seabird and marine mammal haul outs and that this needs to be acknowledged for spills and cumulative impacts and the PFEIS needs to address water treatment impacts at the port. AECOM stated that they can add this information. NPS will provide reports to AECOM/USACE. USFWS noted lack of information regarding another water treatment plant at the port to deal with wash water, stating that no discharge information is provided in the document and that there could be impacts on benthics etc. State of Alaska agreed and noted that there were no details on water treatment for this water treatment plant.

Landscape level impacts to fish populations (portfolio effect)

DRAFT FOR DISCUSSION

- USFWS noted the importance of considering habitat impacts from multiple sources and that cumulative impacts and RFFAs could erode habitat and that this is not adequately addressed; even small impacts can have disproportionate impacts; incremental degradation can lead to impacts; additional analysis of cumulative and expanded mine scenario needed; they questioned how much development of Pebble could facilitate development of other potential mines in area; EIS focused on local scale impacts, not enough focus on expanded portfolio concept. EPA noted issue of local adaptation of fish, stating that the EIS does not support conclusions that there would be no effect on genetic diversity and that habitat is not interchangeable.

- NPS noted that the statement in 4.18 regarding mass loading having no impacts is unsubstantiated. NPS also noted statement in K4.24 is also unsubstantiated regarding mercury releases not expected to have adverse impacts; NPS noted that changes may be within water quality standards, but minor changes can still have impacts - nearby lake waters have low mercury levels, yet fish have elevated mercury levels, so the document needs to consider transfer from water to biota. Curyung noted that then fish get eaten by humans, and that even if water quality criteria are met, bioaccumulation could still be an issue that is not addressed in the PFEIS. USFWS noted that there is a dismissal of selenium and mercury, and that small amounts in water can lead to bioaccumulation, and that the lack of discussion on mercury is incorrect based on scientific knowledge.

Additional Fish topics:

- ADFG noted the new mention of the berm on the bottom of Iliamna Lake to support the pipeline, and that there is no analysis of impacts from installing berm, or impacts if pipeline falls off berm.

- ADFG noted a misrepresentation of the Koktuli River as low volume use, but that it is actually very high value use based on status as float trip river. AECOM appreciated the new information.

- EPA noted new references for portfolio effect; 26 genetic reporting groups identified.

- ADFG noted that is difficult to follow the analysis, and that the analysis may have been more robust than presented; impacts could be broken down more in tables; more info on overwintering in particular is needed. AECOM to review text for clarification.

- Curyung commented on fish consumption and relevant ADEC water quality standards; they stated that the EIS underestimates fish consumption as the studies on which it is based are ~15-16 years old and are not a reflection of current consumption. USACE noted that the EIS uses the best data that is available.

Mitigation

- USACE gave an overview of the three comments received pertaining to mitigation and the draft mitigation plan for the project. USACE gave an overview of the process in decision making and the role of compensatory mitigation in the NEPA process and unique challenges pertaining to compensatory mitigation planning and the pebble project and noted that no decision regarding compensatory mitigation for the project has been made at this time. EPA expressed that mitigation, including compensatory mitigation, is included under NEPA and that they feel it should be discussed in the EIS and if not, questioned where it would be discussed. USACE indicated that a detailed discussion of compensatory mitigation will not be discussed in the main EIS but it will be discussed in the ROD. EPA expressed concern that the state of the current compensatory mitigation plan is very high level and does not include much detail. USACE noted that it would be inappropriate for them to speculate impacts for the compensatory mitigation plan as they have not yet completed the environmental analysis. EPA stated their initial reaction is that for beach cleanup and waste water proposals there is no explanation for what amount or type of loss is offset by the proposal. The CMP has a little information on culverts – 8.5 miles of stream habitat opened up per CMP – but no details provided to back it up. Also, it is unclear if the CMP is focused on compensating for direct losses or all losses. USACE: it is premature to speculate on final CMP details.

- EPA questioned whether there would be a broader opportunity to get more information from the public regarding the compensatory mitigation plan. USACE indicated that there would not be, noting that this is a

unique project, however this is the typical process which they follow. Curyung questioned why not hold a public scoping event for the development of the compensatory mitigation plan. USACE noted that they are following the standard process which does not solicit input and they will not do it with this project. EPA noted that ~~there is an avenue in which~~ regulations allow for USACE ~~could~~ to require public scoping for the compensatory mitigation plan for a project of this size if they choose to. Curyung reminded USACE that it held a 30-day public comment period on the final compensatory mitigation plan for the Donlin Mine. USACE indicated that they are aware and would table this discussion until further internal discussions occur.

- Lake and Peninsula Borough raised concerns regarding the compensatory mitigation plans, highlighting concerns that the plan would allow for compensatory mitigation to take place outside of the watershed and benefit communities not impacted by project development. Elaborated that if you develop a compensatory mitigation plan based off mitigation credits in a remote area such as this, it could allow the applicant to repair road culverts or take compensatory action somewhere else that would not benefit the local population and suggest there may be a better way to handle compensatory mitigation. EPA notes that no matter what the applicant proposes to do that it must fit within the regulatory framework first and foremost, which includes a compensatory mitigation plan. Curyung suggests holding a public meeting and asking the tribes what they would like to see for compensatory mitigation. EPA indicates that a careful discussion with the tribal governments seems merited for this. USACE to consider.

- ADFG noted that there are many different types of culverts and that it would be incumbent for decision makers to carefully review culvert data for culvert replacements as necessary per mitigation. ADFG noted that PLP focuses on "red" category of culverts as identified by ADFG, but that this category is judged by a juvenile fish standard – if drop is ~>4" juvenile salmon may not be able to get into and through the culvert. Using that "red" category, as PLP did, to identify culvert projects, and then to conclude that their plan would open up 8.5 miles of streams to salmon, is too simplistic, and likely wrong. What does not work for juveniles may be ok for adult salmon. Also, what is the habitat that is opened up by the culvert plan? That is not clear, and can vary widely. ADFG elaborated that placing a certain type of culvert in one location could have benefit, so as mitigation moves forward ADFG encourages that a close look be taken at culverts. USACE to consider.

- EPA indicated that an assessment of effectiveness for mitigation measures should be added to Table 5-2 which includes proposed mitigation measures. EPA understands that many of which are BMPs, however they feel it would be useful to include. USACE to consider.

- Curyung notes that USACE should consider the full context of uncertainties regarding the full impacts when developing the compensatory mitigation plan. Noting that if the full impacts are uncertain, it is difficult to properly target compensatory mitigation. Curyung noted that this is a cross-cutting issue and is not just about appropriateness of the CMP. The EIS must accurately identify impacts to fish habitat as a precursor to adequate CMP, yet as discussion over these days has shown, those impacts are not accurately identified in PFEIS. Corps should do new Draft EIS to fix this, and bring in CMP through that for public review and input as well. This would allow for a holistic look, while current approach does not.

Wildlife

- AECOM begins reviewing comment pertaining to sea otters and request for clarity from NPS. NPS indicates that the comment was specifically related to a lack of discussion regarding otters along the Katmai coast. AECOM indicates that this was left out originally as it is outside of the action area, but will add the information into the spills section of the EIS. NPS indicates that they have 2018 data pertaining to seals and sea otters along the Katmai coast and will send it to AECOM.

- AECOM gives an overview of comments received pertaining to brown bear movement and requests further clarification from ADFG. ADFG elaborates that while the analysis does examine published literature there is a lack of data in the region about bear population, so cannot ~~to~~ support conclusion language in the EIS. AECOM to revisit language in the section. NPS recommended removing conclusion that impacts to brown bear populations would be in the range of their natural variability for lack of data to support conclusion

- USFWS expressed that the EIS should exercise caution when discussing the Mmarine Mmammal Pprotection ~~a~~Act (MMPA) and asked that USACE not make assumptions about future MMPA compliance as that is not justified. There is a lot of uncertainty around PLP's MMPA compliance. Additional USFWS comment on the

use of red lights as not being the current guidance. USFWS also indicated that the EIS should disclose that potential invasive species are not limited to vegetation.

- USCG posed the question to USFWS as to whether or not they are comfortable with the methodologies and data used pertaining to surveys of eagles, raptors, and migratory birds. USFWS indicated that they will continue to inform the applicant that they will have to work with USFWS as the project moves forward, but as for now to proceed with the current survey data. USFWS indicated that they currently have no legal authority but advise the applicant to take all precautionary measures moving forward.

- NPS raised concerns regarding a statement in EIS suggesting there are no measureable impacts on wildlife populations expected. For example, road use analysis focuses on trucks but does not mention support vehicles. The 21-minute interval between trucks is also a concern; should consider an 8-hour closure a day to allow predictable safe time for bears. NPS said the conclusion of no measurable impact on wildlife is not justified. NPS requested that the statement be revisited for accuracy. NPS also indicated there was a bear movement map that ~~believe~~ should be included in the EIS. Additionally, NPS and ADFG raised concerns regarding the description and representation of road traffic in the EIS. AECOM to review.

Subsistence

- AECOM begins reviewing topics pertaining to subsistence sections and asks EPA for clarification regarding first comment pertaining to the value of traditional foods. EPA elaborates on how traditional foods are shared throughout the subsistence network and that while it is uncomfortable to try and quantify the social costs of the loss of traditional foods, it is real to quantify how much the replacement food would be for people and suggested that doing so would be a worthwhile effort. Curyung echoed the concern and posed the question of how to quantify the value of culture that could be lost. AECOM to consider.

- EPA notes that this exercise has been done for other tribes throughout the nation and while it is not widely done, USACE may consider this. ADFG highlighted that subsistence data used in the EIS for communities is 15-16 years old and a lot has changed since then. ADFG says more current subsistence baseline data is key. The Mulchatna caribou herd changes are one example of this. AECOM acknowledges this and clarifies that it is acknowledged in the EIS as a data gap.

- AECOM gives overview of next comment pertaining to the quality of traditional food and monitoring of food quality and asks for additional information and clarification pertaining to the comment. EPA elaborates that the comment refers to the health and quality of the food, suggesting that in the EIS there is no mechanism in place for monitoring the quality of food and associated health impacts such as the bio-accumulation of metals. The EIS must evaluate these impacts. AECOM indicates that there is a mechanism for this described in the EIS and it is included in the Human Health Sections 3.10 and 4.10. AECOM highlights that the social sections of the analysis are informed by the biological and physical analysis in the EIS and that social sections take into account all biological and physical impacts. ADFG: Technical Paper 549 addresses subsistence networks in Pedro Bay area, for example, and shows the role of super-harvesters who move around.

- AECOM reviews next comment pertaining to the analysis of medicinal plants in the EIS and indicates that AECOM is aware of this and will coordinate with the vegetation team to bolster the discussion of medicinal plants.

- AECOM reviews a comment pertaining to the inclusion of information on seals. AECOM notes that since the draft EIS they have incorporated additional information on seals and the Mulchatna caribou. EPA notes that subsistence did not give enough detail regarding Iliamna Lake freshwater seal harvests in local communities. EPA suggest more information about how, when, and where Iliamna Lake freshwater seals were harvested should be included. EPA elaborates that there could be an Iliamna Lake freshwater seal harvest network between communities in the region and that seal harvest is closely connected to the cultural variability of the region. AECOM to consider and asked for any specific helpful references. ADFG recommends specific technical papers (459 and 416) on the issue.

- NPS clarifies comment and raises concerns regarding the characterization of subsistence users who may be misplaced due to project impacts and recommends adding additional text highlighting the possibility of displacement creating competition or lack of/loss of local traditional subsistence knowledge. EPA and ADFG

DRAFT FOR DISCUSSION

echo the concern and highlight that displacement of subsisting communities could have more widespread impacts due to geographic limitations and challenges to subsistence. EPA notes the high use of the project area and that subsistence is place-based, so overall population level impacts on target fish and wildlife is not the only relevant metric for impacts to subsistence. To be forced from a place has potentially big impacts and access, resources in the area, and tradition all come into play. Nondalton notes that subsistence areas often are multi-generational, i.e., fish camps, and the EIS needs to look at these individually. Nondalton suggests the EIS should look at this in the cultural resources sections 3.7, 4.7, 3.9, and 4.9.

- AECOM gives an overview of comment pertaining to traditional ecological knowledge and asks if there is any additional information they should be aware of to consider and incorporate into the EIS. NPS notes that they are specifically interested in the inter-generational transmission of subsistence knowledge in local communities. NPS suggests that additional language could be added for clarity and consistency throughout the document. AECOM to consider. Curyung notes that they are working with BLM and the Federal Subsistence Board to get ANILCA Section 810 analysis and that this is relevant to NEPA analysis. USACE: let's talk more about that.

- Nondalton raises concerns that subsistence data is 15-16 years old and ~~may be~~is inadequate and inappropriate to use in the analysis. USACE and AECOM clarify that this is the best available data to be used as per NEPA guidance and that language pertaining to the data process is included in section 3.1 of the EIS. Nondalton suggest that the EIS be more clear that the analysis is relying on historical subsistence data.

Additional Topics Discussed

- NPS raises concerns regarding environmental mass loading of metals due to water effluent and suggest there is a potential lack of toxicological impacts associated with effluent. NPS also indicates that this concern pertains to effluent discharges into marine waters as well. NPS says water quality needs to be looked at for all relevant river systems and the Cook Inlet. Nondalton agreed. USACE to consider.

- Curyung noted that the 20-year mine plan results in significant degradation to waters of the US and is contrary to the public interest. Curyung also expressed concerns that the 20 year mine plan is not the real plan and suggests that the expanded scenario is the likely plan from the applicant. PLP says they have no current plans to mine more than 10% of the deposit over 20 years, but PLP also says as recently as March 5 that mining the rest is "likely." PLP did not provide a preliminary economic analysis and USACE has accepted the 20-year plan without question and with no objective basis. Economic feasibility affects the analysis of alternatives, for example, USACE screened out options such as dry tailings on the basis of being too costly. But how can the agency conclude that when doesn't know the project's economics.

- Nondalton raised concerns regarding an apparent contradiction between section 4.9 and 3.7 regarding project footprint and suggested that south of Frying Pan Lake be included in the project footprint. Nondalton also questioned whether there would be a revised Draft EIS and an additional public comment period or if the next version will be the final. USACE indicated that the next version will be the final and there will not be another public comment period.

- USACE closes by giving an overview of next steps in the process of the development of the EIS, ROD, and decision making process for the Pebble Project.

Return to Excerpt

Curyung Tribal Council
P.O. Box 216 – 715 Seward Street
Dillingham, Alaska 99576
Phone: (907) 842-2384 - Fax: (907) 842-4510

Curyung Tribal Council Cooperating Agency Technical Comments on the Pebble Project (POA-2017-00271) Preliminary Final EIS

Return to Excerpt

Introduction

In our role as a Cooperating Agency, Curyung Tribal Council (Curyung) submits these technical comments on the Army Corps' Preliminary Final EIS (PFEIS) for the Proposed Pebble Mine Project. While more time would be necessary to give the Corps a full picture of the lacking information and analysis and unsupported conclusions in the PFEIS, this document outlines Curyung's concerns and recommendations in the short time we've had to review.

Curyung objects to the limited time to review the PFEIS (45 days) in light of project changes and new analysis contained in the PFEIS that differs drastically from the Draft EIS. Changes to PLP's proposal are reflected in PLP's multiple modifications to its project description and revisions to its 404 permit application submitted to the Corps in January 2020. They are also reflected in PLP's responses to over 150 formal Requests for Information occurring after the release of the Draft EIS. Curyung notes that responses to Requests for Information are *still occurring during the cooperating agency review period for the PFEIS*, with 8 new or updated RFIs added to the project file in February and March 2020.[1]

Because of the new information and new project designs contained in the PFEIS, Curyung strongly recommends the Corps issue a new Draft EIS for public review and comment, in order to comply with NEPA. In light of these recent changes and new analysis, the Draft EIS from last year was woefully inadequate to provide the "meaningful analysis" that NEPA requires.[2]

Curyung has significant concerns with the PFEIS analysis as well and recommends the below changes be incorporated, state permit applications submitted, and further field work undertaken prior to the Corps issuing a new Draft EIS for public review and comment. The missing information that would be provided from further field work and state permit applications is necessary to inform the NEPA analysis of impacts to salmon, salmon habitat, waters, subsistence, and the people of the Nushagak.

Chapters 1 & 2 and Appendix B – Purpose and Need, Alternatives Development, and Economic Feasibility

Curyung Tribal Council's Recommended Alternative. Curyung Tribal Council reiterates that the only acceptable alternative is the no action alternative. Moreover, Curyung notes that the PFEIS, by excluding any analysis of alternative mine designs and configurations, is inadequate to support the selection of a Least Environmentally Damaging Practicable Alternative (LEDPA) that would allow for the construction of the proposed Pebble Mine

[1] These new and updated RFIs made available during cooperating agency review of the PFEIS, and thus not incorporated into the PFEIS, include: RFI 21i Water Treatment Process Updated (March 17, 2020); RFI 163 Vessel Route for Bulk Carriers (March 9, 2020); RFI BSEE 2 Cook Inlet Natural Gas Pipeline Maintenance Schedule (March 5, 2020); RFI BSEE 1 Cook Inlet Natural Gas Pipeline Installation Methodology (March 5, 2020); RFI 162 Construction Schedule and Site Access During Construction (March 5, 2020); RFI 161 Watershed Model and Streamflow Change (Feb. 27, 2020); and RFI 149 Fish Habitat Modeling Results for Adult Resident Salmon by Stream Reach (Feb. 27, 2020).
[2] 40 C.F.R. § 1502.9.

Project. All proposed action alternatives in the PFEIS would result in very similar destruction to lands, waters, subsistence, cultural resources, and fish habitat and the Corps has failed to present a range of alternatives to avoid these impacts that would allow it to select the LEDPA as required under the Clean Water Act.

> Recommendation: If the Corps moves to a Final EIS and ROD under the current record, it must deny the 404 permit application and in effect select the no action alternative. Otherwise, the Corps should revise the EIS with additional action alternatives that would lessen the impacts to resources (such as alternatives of smaller mine footprints, underground mining, dry stack tailings, removing the tailings from Bristol Bay, etc.) and reissue the EIS for public review and comment. As it stands now, the PFEIS fails to consider an adequate range of alternatives as required under NEPA.

Purpose and Need. The PFEIS fails to consider the broader public interest and need for this project, and thus the entire framework of the PFEIS analysis is flawed and in violation of NEPA. The Purpose and Need statement in Chapter 1 of the PFEIS responds only to the project applicant's needs, and not the needs of the Bristol Bay people. Failure to properly define the purpose and need has led to a faulty analysis of the range of reasonable and practicable alternatives in the EIS that has failed to consider the actual needs of mineral products versus the destruction of the world's greatest salmon commercial fishery and, importantly, the world's last salmon-based culture. Curyung notes that the proposed Pebble Mine project would do little to meet current demand for copper and other minerals, and would provide the global market with merely 56 days of supply based on 2017 demand.[3] Moreover, *global demand for copper is currently dropping and this new trend must be accounted for in this NEPA document, a the NEPA document must use the best available and current data to support its analysis*.[4] Demand for minerals – without the broader context of the importance of Bristol Bay salmon for the people of the region and their lifestyle and sustainable economy – leads to an unreasonable purpose and need statement and faulty EIS analysis.

> Recommendation: Redefine the purpose and need statement, revise the project alternatives and EIS analysis accordingly, and reissue the revised Draft EIS for public review and comment. A proper purpose and need statement must reflect the broader public interest and need for this project. Revise the purpose and need statement to account for the *reduced demand for copper and copper oversupply globally* based on the most recent (March 2020) data regarding the demand for copper and other minerals.

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[3] *See* USGS National Minerals Information Center, Copper Statistics and Information Annual Publication for 2018, *available at*: https://www.usgs.gov/centers/nmic/copper-statistics-and-information. ("The International Copper Study Group projected that global refined copper consumption would be approximately 24 million tons [48 billion pounds] in 2017."). 7.4 billion pounds from Pebble / 48 billion pounds global consumption annually = 0.1542 * 365 days per year = 56.3 days.

[4] See, e.g., Wall Street Journal, *Copper Slides as Coronavirus Hits Demand, Exchange Activity* (March 23, 2020) https://www.wsj.com/articles/copper-slides-as-coronavirus-hits-demand-exchange-activity-11584973154; Reuters, *Rupture of copper demand to fuel surplus as industry hit by virus* (March 23, 2020), https://www.reuters.com/article/us-metals-copper-costs-graphic/rupture-of-copper-demand-to-fuel-surplus-as-industry-hit-by-virus-idUSKBN21A2PN

Screening of Alternatives without Economic Feasibility. The PFEIS Appendix B continues to rely on economic considerations as a mechanism for screening out project alternatives. Curyung reiterates its concerns that the Corps cannot screen out project alternatives based on cost without an adequate, independent review of the project's 20-year mine design. For example, the PFEIS Appendix B screens out dry stack tailings storage and underground mining, two alternatives that, if assessed in the EIS document, might prove to have lesser impacts to fish, fish habitat, and subsistence from the current proposed design. Without this information, the Corps cannot reasonably screen out project alternatives as too costly.

The Corps' reliance on any economic assertions from PLP are arbitrary, as the company has failed to provide an economic feasibility report for its proposal and instead provided an insufficient economic model to the Corps in RFI 059a. Meanwhile, according to the company's most recent filings with the Securities and Exchange Commission, it has not selected a final mine design and has not shown its current NEPA project to be economically feasible, indicating future project changes might still occur:

- "Northern Dynasty, through the Pebble Partnership, also continues to advance engineering studies. Northern Dynasty cautions that the current Project Description may not be the ultimate development plan for the Pebble Project and that a final project design has not been selected"[5]
- "the Company cautions that the plan described above may not be the final development plan. A final development design has not yet been selected."[6]
- "The proposed project uses a portion of the currently estimated Pebble mineral resources. This does not preclude development of additional resources in other phases of the project in the future …"[7]
- "There can be no assurance that any future economic or technical assessments undertaken by the Company with respect to the Pebble Project will demonstrate positive economics or feasibility."[8]

Since the Corps has used project economics as a criterion for screening out project alternatives, it must use the best available information to base its alternatives screening decisions. The Corps has failed to do so, RFI 059a is lacking sufficient detail and is based on arbitrary project assumptions. Thus, the entire NEPA analysis that flows from the assumption that the 20-year mine design is economically feasible is faulty.

> Recommendation 1: Require a full, independent economic feasibility report in compliance with Canadian securities law NI 43-101 for the proposed 20-year mine design, in accordance with the Army Corps' authority to require independent economic feasibility of projects, pursuant to its public interest review regulations at

[5] Northern Dynasty Minerals Ltd., Management's Discussion and Analysis Three and Nine Months Ended September 30, 2019 (filed with the SEC on Nov. 22, 2019), at page 7, *available at*: https://www.sec.gov/Archives/edgar/data/1164771/000149315219018260/ex99-2.htm.
[6] *Id* at page 9.
[7] *Id*.
[8] *Id* at page 27.

33 C.F.R. § 320(q).[9] Require that PLP re-submit its economic model in RFI 59a based on the independent economic feasibility report.

Recommendation 2: Require that PLP's economic model in RFI 059a be amended to contain a similar level of analysis as its 2011 Preliminary Economic Assessment and to be updated properly from the 2011 report. For example, the following information, assumptions, and sensitivity analyses should be undertaken and updated in the RFI 059a economic model for the Corps to have an adequate evaluation of the economic feasibility of the project and project alternatives:

- *Adjustments for inflation* – PLP's RFI 059a economic model is based on capital and operational expenditures in PLP's 2011 Preliminary Economic Assessment (PEA), and as such these capital cost figures are based on 2011 dollars. PLP's RFI 059a economic model is identical to the 2011 PEA for the following capital costs: other infrastructure, tailings, access road, port infrastructure, and power generation.[10] These figures must be updated to account for inflation. The model must be re-run by accounting for inflation, as proper capital expenditure figures are necessary to obtain an accurate calculation of the net present value.
- *Updated estimations of capital expenditure costs* – Likewise, PLP's RFI 059a economic model is based on capital costs calculated in its 2011 Preliminary Economic Assessment and cannot be relied on because the current infrastructure proposed differs substantially. While the RFI 059a economic model includes some adjustments for capital costs for mining, process, moly separation, secondary gold recovery, and power generation, it does not include adjustments for capital expenditures for other infrastructure, tailings, access road, and port infrastructure. These components differ substantially from the 2011 PEA, and update capital expenditure figures are required for an accurate net present value calculation. Moreover, because capital costs of mining projects are unpredictable and usually underestimated, a sensitivity analysis for the capital costs must be included, as was undertaken in PLP's 2011 PEA.[11]
- *Adjustments for local, state, and federal tax revenues and royalties (annually)* – PLP's RFI 059a economic model fails to incorporate annual local, state, federal, and corporate income taxes and royalties. These figures can be quite substantial and will impact the annual cashflow, revenues, and calculation of net present value. As shown in PLP's 2011 Preliminary Economic Assessment, the pre-tax and post-tax numbers can differ substantially. PLP currently touts the following annual tax figures that should be taken into consideration: $49-66 million annually for state taxes and royalties and $19-21

[9] 33 C.F.R. 320(q) ("the district engineer in appropriate cases, may make an independent review of the need for the project from the perspective of the overall public interest. The economic benefits of many projects are important to the local community and contribute to needed improvements in the local economic base, affecting such factors as employment, tax revenues, community cohesion, community services, and property values.").
[10] Compare initial capital costs from 2011 PEA (available here: https://www.northerndynastyminerals.com/news/news-releases/2011/northern-dynasty-receives-positive-preliminary-assessment-technical-report-for-globally-significant-pebble-copper-gold-molybdenu/) to the RFI 059a capital costs.
[11] See Northern Dynasty Minerals Ltd. and Wardrop, Preliminary Assessment of the Pebble Project, Alaska (Fe. 15, 2011), at page 487.

million annually to Lake and Peninsula Borough revenue taxes.[12] Corporate income taxes – which can be as high as 30% - must also be taken into consideration when calculating the net present value of the 20-year mine.

- *Sensitivity Analysis for Mineral Prices* – The world is currently experiencing a drastic and fast-paced decline in metal prices, with the price of copper falling by 22% this year alone.[13] As noted in PLP's 2011 Preliminary Economic Assessment, the Pebble project economics are extremely sensitive to metal price fluctuations.[14] As such, the 2011 report conducted a sensitivity analysis for metal prices, analyzing the impact of various metals prices on the project's net present value. RFI 059a should include the same sensitivity analysis. However, RFI 059a includes only one set of metals values and *assumes a copper price of $3/lb, when in fact the current price of copper is $2.17/lb*. A sensitivity analysis of various metals prices is necessary for a reliable net present value calculation.
- *Accounting for Post-Year 20* – PLP's RFI 059a economic model inappropriately stops at mining year 20. Stopping the model abruptly means that it fails to account for any costs post-dating year 20, when PLP says it will begin closing and reclaiming the mine. Closure and reclamation is a costly endeavor and would weigh negatively on the net present value of the entire project, as there is no income at the time to offset its costs. And yet, PLP's net present value calculation in RFI 059a fails to consider any of the costs post-year 20, meaning all costs associated with water treatment, reclamation, remediation, long-term monitoring, and closure. The failure of PLP's RFI 059a economic model to include this information when calculating net present value is a fatal flaw. The model must be revised and extended beyond year 20 to account for these costs, and be re-run to calculate the net present value.

Recommendation 3: Review the results of an independent economic feasibility report and revised RFI 059a and revise the EIS purpose and need statement and selection of alternatives accordingly. It is Curyung's contention that the 20-year mine design itself is not economically viable and PLP would need to expand its operations beyond the 20-year mine pit. The EIS document must account for this eventuality, and the alternatives assessed must include this possibility and describe the impacts on project design. For one example, if PLP continues mining beyond year 20, the company will not be placing the pyritic tailings back into the open pit at year 20, but would rather need to store the pyritic tailings in a storage facility until mining is completed. What would such a tailings facility look like? Where would it be located? What will its design parameters be? What is the likelihood of failure? How much salmon habitat will it destroy? And what are the impacts of this facility long-term on the people of the Nushagak? These questions of economic feasibility and impacts from expansion are essential to understanding the proposed Pebble mine project and remain unanswered in the PFEIS.

[12] https://www.northerndynastyminerals.com/site/assets/files/4802/ndm_4pager_feb262020-web.pdf
[13] https://www.macrotrends.net/1476/copper-prices-historical-chart-data.
[14] See Northern Dynasty Minerals Ltd. and Wardrop, Preliminary Assessment of the Pebble Project, Alaska (Feb. 15, 2011), at page 487.

Chapter 3.7 – Cultural Resources

Affected Environment Not Adequately Described. The PFEIS fails to adequately describe the importance not just of the fish themselves but also the humans that are dependent on those fish populations. Our cultural identity is directly tied to salmon. The Nushagak River people are inadequately described in the PFEIS and impacts to our people are ignored. The Nushagak is the only river that flows in Bristol Bay that had two different and distinct cultures living along the river at the time of contact – the Aglegmuit of the lower river and bay and Kiatagmiut of the upper river.

> Recommendation: The Corps must do a more complete literature review and incorporate information about the Nushagak peoples in the EIS document. The following resources to help provide for a more complete description of cultural resources, for example:
>
> - VanStone, Eskimos of the Nushagak River: An Ethnographic History, Seattle : University of Washington Press, 1967[15]
> - Nushagak-Mulchatna Watershed Council (NMWC) 2007 Nushagak River Watershed Traditional Use Area Conservation Plan. Dillingham and Anchorage: Bristol Bay Native Association, Curyung Tribal Council, and The Nature Conservancy.

Ongoing Surveys and Missing Information. The PFEIS admits that cultural resource surveys and ethnographic research is ongoing and incomplete. This information is critical to inform an analysis of the NEPA and LEDPA alternatives. Indeed, the NEPA process is supposed to be informed by the National Historic Preservation Act 106 process, which has yet to conclude and the Corps has failed to properly use the 106 process to inform the NEPA alternatives throughout this process. PLP has yet to submit a Cultural Resources Management Plan (CRMP) for incorporation into the EIS document. The CRMP is a document that the entire public should be given the opportunity to review and comment on and it, alongside new and ongoing cultural resources survey information, should be provided to the public for review and comment.

> Recommendation: Require PLP to complete all cultural resource surveys and ethnographic research currently underway and all surveys and research PLP has planned for 2020. Revise the EIS only after all information has been obtained from PLP and adequate surveys have been finalized. Once all information is provided to the Corps, revise the EIS and reissue it for public review and comment. Allow the public the opportunity to comment on the CRMP.

Chapter 3.9 – Subsistence

Inclusion of an ANILCA 810 Analysis – Impacts to 17b Easements. The PFEIS fails to acknowledge that a subsistence impacts analysis is legally required pursuant to ANILCA. Section 810 of ANILCA provides:

[15] https://www.worldcat.org/title/eskimos-of-the-nushagak-river-an-ethnographic-history/oclc/244587

> "In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes."

The PFEIS concludes that an evaluation of subsistence impacts pursuant to Section 810 is unnecessary because there are no federal lands in the project area. "There would be no project components proposed on federal lands where the subsistence management provisions of ANILCA would apply." But the PFEIS is incorrect. All action alternatives implicate impacts to ANCSA Section 17b easements. As noted in the PFEIS Chapter 3.2:

> The Applicant's Preferred Alternative would cross three Section 17(b) easements (two also crossed by Alternative 1 or Alternative 3, and one is off the Iliamna-Newhalen Road). Alternative 1 would intersect 1 Section 17(b) easement, on the southern shore of Iliamna Lake. Alternative 2 and Alternative 3 would intersect 2 Section 17(b) easements; both begin at the northern shore of Iliamna Lake and continue north

ANCSA Section 17b easements are public lands, reserved by the U.S. for access to public land and water on lands that have been or will be conveyed. ANCSA Section 17b easements provide access to subsistence opportunities on publicly owned land, and as such, are subject to ANILCA Section 810.

> Recommendation: Curyung reiterates our request to the federal government evaluate the subsistence impacts of the proposed alternatives under ANILCA Section 810. The Corps must not proceed to a Final EIS until an ANILCA Section 810 analysis is complete and the public has had the opportunity to review and comment on this analysis in a revised Draft EIS.

Chapter 3.10 and 4.10 – Health and Safety

Health Impact Assessment. Curyung reiterates our request for a Health Impact Assessment, conducted by the Corps and the State of Alaska, and incorporated into the EIS document. The people of the Nushagak River, downstream from the mine site, will be adversely impacted by construction and regular operation of the mine for more than two decades. These health impacts are not adequately assessed in the PFEIS. Health Impact Assessments offer a systemic methodological framework for factoring public health concerns into decision

making.[16] A Health Impact Assessment should pay particular attention to the determinants and associated feedbacks that contribute to public health and wellness in rural Alaska.[17] Health Impact Assessments are widely used in NEPA documents throughout Alaska and health impacts are a requirement of NEPA. Pebble mine is the largest proposed development project for southwest Alaska ever and will have lasting impacts to the health of the people who live downstream. The PFEIS ignores a broad range of health impacts to the people downstream of the mine, and does so by failing to undertake a Health Impact Assessment. Without an assessment, the PFEIS's conclusions that mitigation will minimize health effects and compliance with existing regulations will prevent health impacts is premature and unreliable.

> Recommendation: Conduct a Health Impact Assessment for the proposed Pebble Mine Project, and revise the EIS accordingly and incorporating information from the assessment. Issue a revised EIS for public review and comment.

Chapters 3.18 and 4.18 – Water Quality

Conceptual Project Design; State Permits Needed to Properly Analyze. Water treatment and storage is a concern for Curyung, as PLP is proposing to use unproven technology on an unproven scale in an unproven climate at the headwaters of Bristol Bay's salmon. According to the PFEIS, the water PLP proposes to treat "would be elevated in several metals that would exceed WQC [water quality criteria]." The EIS discloses that the water PLP intends to treat contains "elevated levels of aluminum, arsenic, beryllium, cadmium, copper, lead, manganese, mercury, molybdenum, nickel, selenium (a metalloid), silver, and zinc in exceedance of the most stringent WQC."[18]

According to the PFEIS, PLP is proposing to treat 38,779,012 gallons per day of mine contact water, slurry, and storage water (combined based on two proposed WTPs) under the 20-year mine design[19] and 52,820,000 gallons per day (approximate) under the 78-year mine design.[20] These figures have increased *substantially* from the Draft EIS figures for water treatment. *The PFEIS water treatment for the 20-year mine design is a 40% increase over the figures for water treatment in the Draft EIS*.[21]

This proposed water treatment is orders of magnitude larger than treatment at any other hardrock mine in Alaska. However, PLP has failed to provide the Corps with anything more than conceptual-level proposals to treat this unprecedented amount of mining water. And the Corps has allowed PLP to move through the NEPA process without providing the information necessary to analyze the proposed project and alternatives impacts on water quality, fish and fish habitat, and in turn on people of Bristol Bay. The PFEIS does not

[16] National Research Council 2011. Improving Health in the United States: The Role of Health Impact Assessment. Washington, DC: The National Academies Press. Appendix A at 150–161. https://doi.org/10.17226/13229.
[17] Loring, P.A. and Gerlach, S.C. (2009). Food, culture, and human health in Alaska: an integrative health approach to food security. Environmental Science and Policy, 12: 466-478.
[18] Preliminary Final EIS, Executive Summary, at page 104.
[19] Preliminary Final EIS, Executive Summary, at page 12 (two water treatment plans proposed to treat influent of 14 cfs and 46 cfs (60 cfs total) converts to 26,929.87 gallons per minute).
[20] Preliminary Final EIS, Chapter 4.1, Table 4.1-2: Assumptions for Pebble Project Expansion.
[21] Compare Draft EIS page 2-33 (proposed influent flow of 43 cfs) to PFEIS page 2-36 (proposed influent flow of 60 cfs).

provide adequate details to know whether PLP will be meeting water quality standards for human health and aquatic life.

> Recommendation: PLP must apply to the Alaska Department of Environmental Conservation for Alaska Pollutant Discharge Elimination System permits for discharging its treated water. The State of Alaska recently stated that Pebble "will undoubtedly change, perhaps significantly so," during the State permitting process.[22] Because PLP's proposed water treatment plans will undoubtedly change during the state permitting process, the Corps should not issue a Final EIS until PLP has been awarded the necessary APDES permits through the state permitting process. Once PLP has received its APDES permits and has settled on a final design for its water treatment plants, the Corps must re-issue the EIS for public review and comment, as the information will differ drastically from the information provided in the 2019 Draft EIS, as already evidenced by the changes from the Draft EIS to the PFEIS.

Chapter 3.23 – Wildlife – Mulchatna Caribou Herd

Updated Baseline Numbers. The PFEIS fails to account for the most recent Mulchatna Caribou Herd information. The PFEIS states that the herd's population is around 27,000. However, the population this year is around 13,500 or below. In fact, ADF&G and DOI closed hunting this year because of the herd's reduced size.[23]

> Recommendation: Amend the figures in the EIS to account for the changes in the herd population over time, including the latest numbers from 2019.

Chapters 3.34 and 4.24 – Fish Values

Updated Baseline Information and Additional Surveys Required. PLP has failed to survey for fish throughout the project footprint. However, according to ADF&G, the agency has found salmon presence in stream locations surveyed by PLP's contractors where PLP found no salmon present.

> Recommendation: Analysis of impacts to fish and fish habitat from project components, specifically roads and culverts and ferry locations, requires additional baseline information, such as:
>
> - Habitat typing – stream widths and depths, gravel typing, bank vegetation, instream vegetation, steam flow, stream temperature, stream conductivity
> - Salmon and other resident fish presence – for all life stages and each location surveyed multiple times per year
> - Hydrology – analysis of hydraulic and hydrology components at all stream crossings and impacted habitat

[22] State of Alaska's Motion to Intervene, *Bristol Bay Economic Development Corporation, v. Hladick*, (3:19-cv-00265), filed February 8, 2020, page 18. https://www.courtlistener.com/recap/gov.uscourts.akd.62717/gov.uscourts.akd.62717.51.0.pdf.
[23] DOI Federal Subsistence Management Program, Mulchatna Caribou Seasons Closed on Federal Public Lands Throughout Range of the Mulchatna Caribou Herd (Dec. 26, 2019), https://www.doi.gov/subsistence/news/general/mulchatna-caribou-seasons-closed-federal-public-lands-throughout-range; KDLG, ADFG to close Mulchatna caribou hunt on state lands (Jan. 28, 2020), https://www.kdlg.org/post/adfg-close-mulchatna-caribou-hunt-state-lands.

Chapter 4.27 – Tailings Dam Failure and Flow Modeling

Tailings Dam Design and Baseline Data Inadequate for NEPA Review. Two months prior to the release of the PFEIS, an internal memo authored by engineers at AECOM warned of the risks to PLP tailings facility integrity without additional field data and testing:

> testing completed to date on the bulk tailings has been minimal. […] Thus, the summary of expected particle size sorting behavior […] in the RFI response [from PLP] is incomplete and misleading. […] **The ability to operate as a flow-through drained facility can only be confirmed with Pebble-specific tailings testing** […] We remain concerned that there are uncertainties as to whether the 55 percent thickened tailings planned by PLP would segregate enough to promote reduction of the phreatic surface near the embankment, which translates to uncertainties regarding the effect of tailings segregation on embankment stability.[24]

PLP's response to AECOM's requests throughout the NEPA process for more geotechnical information, specific tailings testing information, and more specific designs has been that PLP refuses to provide such information. Examples of PLP refusing to provide this information include:

- "PLP is not proposing to finalize the 2018 geotechnical fieldwork report until after additional monitoring data for the holes drilled has been collected." - PLP response to RFI 009g (June 10, 2019)
- "Site-specific tailings testwork will be completed to support the preliminary design phase of the ADSP. Results from this testwork will be used to validate the material parameters, and if required, update the liquefaction analysis and embankment design during the preliminary and detailed design phases. The testwork will include index testing to enable geotechnical classification of the materials, slurry settling, air drying, consolidation and permeability testing, and strength testing to determine the characteristics the tailings." - PLP response to RFI 008h (Sept. 20, 2019)
- "The tailings testing program, which is expected to be completed during the preliminary design phase of the Alaska Dam Safety Program, will include index testing to enable geotechnical classification of the materials, slurry settling, air drying, consolidation and permeability testing to determine the characteristics the tailings. This testing will occur under a range of conditions to be representative of expected field conditions. Results from this testwork will be used to validate the sensitivity analyses and material parameters used in the seepage analysis completed to date." - PLP response to RFI 008h (Sept. 20, 2019)
- "The design of the embankment structures, including detailed stability analyses will be completed as per the design requirements outlined in the ADSP." - PLP response to RFI 008h (Sept. 20, 2019)

[24] AECOM, Technical Memorandum to Bill Craig, AECOM (Dec. 13, 2019), Pebble Project EIS – Bulk TSF Embankment Seismic Stability Analysis, at pp. 1-2, available at https://pebbleprojecteis.com/files/86882482-1f9a-4846-8fa5-354c4f5a8230.

- "The stability analysis will be updated on an ongoing basis as the preliminary and detailed design phases of the ADSP are advanced." - PLP response to RFI 008h (Sept. 20, 2019)
- The locations of these [tailings facility] drains are to be determined…" - PLP consultant response to RFI 109e (July 25, 2019)

PLP's refusal to provide AECOM this information, and the Corps' allowance of PLP's deferral to a future state permitting process, means the analysis of potential impacts from the project is not using the best information and best science. Robust scientific analysis in the context of such large gaps requires more than one round of review and input from experts and is a necessary step to ensure scientific and public integrity for the Corps' EIS.

> Recommendation: The Corps should require PLP to provide the above missing information, and all other missing information identified by cooperating agencies and AECOM related to dam design and geotechnical hazards, necessary for analyzing tailings dam design and impacts from the project. Adequate information likely requires additional field work from PLP, as well as state applications for dam safety. The Corps should align its NEPA process with the Alaska Dam Safety Program process for a more comprehensive and efficient review of the dam design and potential impacts. Once the Corps obtains this information and PLP has submitted its applications for dam safety, the Corps should issue a revised Draft EIS for public review and comment.

Groundwater Data Incomplete. According to PLP's latest filing with the Securities and Exchange Commission, in summer 2020, PLP plans to conduct "pump tests to confirm groundwater characteristics" at the mine site.[25] This information is necessary for the EIS document, as it will be important to help inform the groundwater characteristics and might result in revisions to PLP's groundwater model (recently revised in 2019 after the Draft EIS).

> Recommendation: Obtain data from PLP's 2020 groundwater pump tests and include this information in the EIS document. Once the new data has been incorporated in the document, release a revised EIS for public review and comment.

Full Failure Modeling. Curyung reiterates its request that the Corps model full dam failure scenarios for the 6 major embankments proposed for the headwaters of the Nushagak River watershed. Those 6 major embankments include:

Bulk TSF – Two Dams:
Main = 545 feet high
South = 300 feet high

Pyritic TSF – Three Dams:
North = 335 feet high
South = 215 feet high
East = 225 feet high

Main WMP – One Dam = 190 feet high

[25] Northern Dynasty Minerals Ltd., Management's Discussion and Analysis, Three and Nine Months Ended September 30, 2019, page 11, available at: https://www.sec.gov/Archives/edgar/data/1164771/000149315219018260/ex99-2.htm.

In the past cooperating agency meetings, Curyung has informed the Corps that any modeling of dam failures should include flow modeling the entire length of the Nushagak River and over long-term time scales. We reiterate our request here. Flow modeling cannot stop in time and place based on arbitrary constraints. Modeling must account for the full range of impacts that might occur. Subsistence and fishing activities throughout the river and tidelands are already impacted from erosion and deposition from the Nushagak River, and understanding how this may change as a result of tailings deposition is an important consideration for the EIS analysis that is currently overlooked.

Dam failures will have a lasting impact on fish and fish habitat and cumulatively will impact Curyung and its members and the entire community. Since the PFEIS has failed to analyze the loss to fish and fish habitat from a dam failure, then the EIS cannot draw reasonable conclusions about the impacts of this loss to the people who use the fish. Salmon is an important cornerstone of food security in the region and our economy, and we are the last salmon-based culture in the world. All of this will be impacted in turn by a dam failure on the Nushagak River system.

> Recommendation: Revise the EIS to include modeling of failures at all 6 major embankments. In the failure modeling, including tailings flow and deposition modeling that extends all the way down the Nushagak River to the bay and extends over long-term time scales. Once this information is included in the EIS document, issue a revised EIS for public review and comment. The dam failure modeling is an important consideration for the public's view of the project alternatives, including dam design.

Climate Change and Water Balance. The PFEIS continues to rely on old data to make conclusions about water balance. This data is inadequate to assess the future water balance problems that might occur if the mine is built. Climate change will increase the amount of rain in the region, increase rain on snow runoff events, and will increase the number of freeze-thaw events. All of which in turn will impact the stability of the proposed earthen dams holding back billions of gallons of water. TEK information tells us that we're seeing increased slips deep in the tundra as it thaws out rapidly and our rain events increase. The PFEIS doesn't address climate change and how increased precipitation and increased freeze-thaw events will impact the probability of failure.

> Recommendation: Revise the water balance analysis to account for climate change predictions of increased water. In turn, analyze the impact of climate change causing increased rain on snow runoff events, increased freeze-thaw events, and increased tundra erosion and how these will impact dam stability.

Chapter 4.3 – Regional Infrastructure and the No Action Alternative

Inconsistent Characterization of Impacts to Regional Infrastructure. In section 4.3.2.1 on page 4.3-4 Regional Infrastructure, the PFEIS concludes that the No Action Alternative "would not affect current or proposed infrastructure including education, health services, water, transportation, sewer, and solid waste operations." However, the PFEIS on section

4.3.2.2 Potentially Affected Communities says "Under the NAA, populations trends would continue. Declining populations in some communities can lead to school closures and other loss of services." This second statement is completely contradictory to the claim made just sentences before it.

> Recommendation: Suggest deleting references throughout the PFEIS that claim human populations throughout the Bristol Bay region will decline over time under the No Action Alternative. There is no evidence to support this contention. Moreover, other places in the EIS contain the contrary conclusion.

Chapter 5 – Mitigation

Inadequate Mitigation for Impacts to Cultural Resources. The PFEIS fails to contain adequate and definitive measures to prevent adverse impacts to cultural resources. As a preliminary matter, the PFEIS fails to fully describe the cultural resources impacted by the project to the Nushagak people. If the impacts are not properly described, the proposed mitigation can never be effective.

Curyung has not been properly consulted on what potential mitigation measures would be the most effective for the people of the Nushagak River. All mitigation measures contained in the PFEIS are *conceptual only* and cannot be relied on to minimize the impacts from the project, as there are no enforcement mechanisms to ensure they will be carried out. Examples of promises for future, speculative mitigation efforts without enforcement and lacking the necessary details outlined in Chapter 5 include:

- "Cultural resource experts *would be* retained during construction activities to respond to any potential cultural sites identified during construction."
- "A Cultural Resources Management Plan (CRMP) *would be* developed for the project."
- "Drug and Alcohol Abuse Prevention, Cultural Sensitivity, Safety, and other workplace programs *would be* developed for all employees."

> Recommendation: Curyung recommends the Corps provide the details of these plans and mitigation measures for the Tribe to review. Unless we know what is specifically being proposed to mitigate impacts to cultural resources, we cannot effectively comment on the adequacy of these measures and what else needs to be undertaken to mitigate impacts to cultural resources. This information should be detailed in a revised Draft EIS.

Appendix D – Responses to Public Comments

Appendix D contains a poor presentation of the public comments received on the Draft EIS and how the agency responded to comments and made changes for the PFEIS. This makes it difficult for Curyung, our members, the general public, cooperating agencies, and other experts to understand how the Corps responded to their specific comments on the Draft EIS. Curyung's name does not appear once in the Appendix D, despite multiple comments we made on the record on the Draft EIS. We cannot know how the Corps has or has not

responded to our concerns with the presentation of Appendix D. Indeed, Appendix D fails to include the amount of detail provided in other NEPA documents for projects in Alaska.

Recommendations:

- For each statement of concern listed in the appendix, include the source of the concern (agency, group, expert, member of the public, etc.).
- For each statement of concern, include direct quotations from the comment letter or oral testimony so that the public does not have to rely on the Army Corps' characterization of the issue, but can rather read the original comment verbatim.
- For the introduction to the comment analysis report (D1.0-D1.3), include a better description of the comments received on the Draft EIS. For comment submissions that were form letters and unique letters, include the percentages supporting the 3 different action alternatives. The Corps should quantify the support for the various alternatives in some way to help decisionmakers analyze the public interest review for 404 permit. In addition for these percentages, identify what percentage of Bristol Bay residents support the no action alternative in comments to the Army Corps. Include information on the number of comments submitted by Alaska residents.
- For the comment analysis report, there should be a summary of all the oral testimony received at the Draft EIS public hearings. This summary should include the statements of concern in each community. This summary should also include the percentages of support for the various alternatives and be broken down by location.

Appendix K Generally

Curyung Tribal Council is concerned that the PFEIS does not comply with NEPA standards for EIS documents. NEPA requires that the analysis of a proposal be included in the main text of the NEPA document, and not be relegated to appendices. Many of the impacts to the Nushagak people, downstream from the proposed mine site, are not described or analyzed in the main body of the EIS document.

Recommendation: The Corps must include analysis of all impacts in the main body of the EIS, and not segregate the description of important downstream impacts into Appendix K.

Appendix K3.1 – Traditional Ecological Knowledge

Generally. Appendix K3.1 contains information valuable obtained from Traditional Ecological Knowledge (TEK) sources, to describing the affected environment and should be better incorporated into the main body of the EIS document.

Recommendation: The Corps must include analysis of all impacts in the main body of the EIS, and not segregate the description of important downstream impacts into Appendix K.

Downstream Affected Environment: The TEK information gathered and used by the Corps focuses primarily on the mine site and project footprint. Thus, the PFEIS fails to include significant TEK about the Nushagak River people and baseline conditions downstream of the mine site. Curyung specifically has provided input to the Corps through its role as a cooperating agency and in tribal consultation regarding the baseline conditions of the Nushagak River and its tributaries. This TEK was apparently ignored, as the Appendix K3.1 sections on cooperating agency and tribal consultation input fails to include information related to the Nushagak River watershed.

> Recommendation: The Corps should honor Curyung's request for government to government consultation on this issue and use the TEK information from these consultation meetings to inform the affected environment sections of the EIS. Once the EIS contains updated TEK information describing the affected environment of the Nushagak River watershed, the Corps should re-issue the EIS for public review and comment.

Existing Documents. The TEK information noted in Appendix K under "existing documents" fails to include information relevant to the Nushagak people. The PFEIS cites to PLP's Environmental Baseline Document chapters on subsistence; however, TEK expands beyond the topic of subsistence and should be used to describe many aspects of the affected environment, including climate, water flow, erosion, plant distribution, fish migration patterns, mammal migration patterns, and the like. The PLP Environmental Baseline Documents cited here are also outdated (based on interviews taken in early 2000s) and updated TEK information about the mine site has been collected by the EPA and PLP contractors since then that should be incorporated into Appendix K3.1 and the main body of the EIS document.

> Recommendation: The Corps should do a more thorough job describing the affected environment utilizing TEK, and not limit the scope of TEK to subsistence information only. TEK serves to provide important information on a wide variety of affected resources and the Corps has not done an adequate job compiling and utilizing this information for the Nushagak River watershed especially. The Corps should conduct more government to government meetings with the tribes in the Nushagak River watershed, including Curyung, and use the TEK information from these meetings to better describe the affected environment. Once a broader picture of the affected environment is presented in the EIS, the Corps should re-release a revised EIS for public review and comment.

Appendix M – Compensatory Mitigation Plan

Public Process. Curyung Tribal Council requests the Army Corps allow for a public comment period on PLP's final compensatory mitigation plan. For efficiency, Curyung recommends that the Army Corps provide this public comment period simultaneously to another public comment period on the revised EIS. The Clean Water Act requires that the Army Corps provide the public an opportunity to provide comments on mitigation of impacts

to wetlands and waters. The draft compensatory mitigation plan provided in the Pebble Project Draft EIS differed significantly from the current draft compensatory mitigation plan, with new proposals and changes to the projected impacts to wetlands and other waters. In addition, the practice of the Army Corps Alaska District has been to allow the public an opportunity to comment on final compensatory mitigation plans, as was the case in the Donlin Mine when the Army Corps allowed for comment on the compensatory mitigation plan for that project.

> Recommendation: Provide a public review and comment period of at least 30 days on PLP's final compensatory mitigation plan.

Permittee-Responsible Mitigation. Curyung Tribal Council opposes the use of permittee-responsible mitigation as the sole means of fulfilling mitigation requirements.

> Recommendation: Require all proposed mitigation measures for the Pebble Mine project have financial assurances of some kind.

Failure to Mitigate for Lost Wetlands. PLP's final compensatory mitigation plan contains zero mitigation for wetlands lost from the project. Under the 20-year mine, the project will result in *direct and permanent loss* of 2,226 acres of wetlands and other waters, 859 acres of temporary impacts to wetlands and other waters, and indirect impacts to 2,019 acres of wetlands and other waters.[26] Under the Clean Water Act, projects are required to compensate for lost wetlands. The proposed Pebble Mine Project will result in wetlands destruction in pristine waters supporting the world's most abundant sockeye salmon run, as well as important foods like king salmon. Losses of such productive and important wetlands cannot be permitted under the Clean Water Act without mitigation of some kind.

> Recommendation: Require mitigation for wetlands losses.

Inadequate Mitigation of Loss of Salmon Habitat. The lost salmon habitat will all occur in the Nushagak River system, and yet nearly all of the proposed permittee-responsible mitigation efforts take place far outside of this watershed.

> Recommendation: Require mitigation for lost salmon habitat in the Nushagak River watershed. The Corps should pursue an open and public process to identify potential mitigation projects in the Nushagak River watershed, and not just seek input from cooperating agencies on mitigation projects. To do otherwise is to artificially limit potential mitigation options to information provided by only a subset of relevant and knowledgeable people. Should the Corps undertake such a process it may identify wetland, waste water treatment, fish passage and other options in the Nushagak River watershed.

Inadequate Mitigation for Water Quality. PLP is proposing to treat and discharge 38,779,012 gallons of water a day for 20 years, and a similar amount of gallons per day post-closure. The water PLP proposes to treat will contain elevated levels of: aluminum, arsenic,

[26] Preliminary Final EIS, Executive Summary, at page 82.

beryllium, cadmium, copper, lead, manganese, mercury, molybdenum, nickel, selenium (a metalloid), silver, and zinc. Inevitably, there will be failures of the water treatment systems and exceedences of water quality standards in the Nushagak River downstream from the proposed mine. However, PLP's final compensatory mitigation plan fails to include any mitigation for lost water quality in the Nushagak River watershed.

> Recommendation: Require mitigation for impacts to water quality in the Nushagak River watershed specifically. The Corps should pursue an open and public process to identify potential mitigation projects in the Nushagak River watershed, and not just seek input from cooperating agencies on mitigation projects. To do otherwise is to artificially limit potential mitigation options to information provided by only a subset of relevant and knowledgeable people. Should the Corps undertake such a process it may identify wetland, waste water treatment, fish passage and other options in the Nushagak River watershed.

Curyung Tribal Council
P.O. Box 216 – 715 Seward Street
Dillingham, Alaska 99576
Phone: (907) 842-2384 - Fax: (907) 842-4510

Curyung Tribal Council Cooperating Agency Technical Comments on the Pebble Project (POA-2017-00271) Preliminary Final EIS

Supporting Studies, Reports, and Literature for Inclusion in the EIS

1. Sean R. Brennan, Daniel E. Schindler, Timothy J. Cline, Timothy E. Walsworth, Greg Buck, Diego P. Fernandez**.** Shifting habitat mosaics and fish production across river basins. *Science*, 2019; 364 (6442): 783 DOI: 10.1126/science.aav4313

2. VanStone, Eskimos of the Nushagak River: An Ethnographic History, Seattle: University of Washington Press, 1967, https://www.worldcat.org/title/eskimos-of-the-nushagak-river-an-ethnographic-history/oclc/244587

3. Native American Ethnobotany by Daniel E Moerman, https://www.amazon.com/Native-American-Ethnobotany-Daniel-Moerman/dp/0881924539

4. Russian Exploration in Southwest Alaska: The Travel Journals of Petr Korsakovskiy (1818) and Ivan Ya. Vasilev (1829) published by UAA via the Rasmuson Library, https://journalhosting.ucalgary.ca/index.php/arctic/article/view/64966/48880

5. Alaska Diary 1926-1931, Alex Hrdlicka published by the Smithsonian Institute, https://catalog.hathitrust.org/Record/001444384

6. ADF&G Technical Paper 453, Nushagak River Chinook Salmon: Local and Traditional Knowledge and Subsistence Harvests by G. Halas and M. Cunningham, http://www.adfg.alaska.gov/techpap/TP453.pdf

7. ADF&G Technical Paper 411, Whitefish and Other Nonsalmon Fish Trends in Lake Clark & Iliamna Lake, 2012 and 2013 by Hazel, Welch, Ream, Evans, Kreig, Johnson, Zimpleman and Carty, http://www.adfg.alaska.gov/techpap/TP411.pdf

8. ADF&G Technical Paper 326, Sharing, Bartering and Cash Trade of Subsistence Resources in the Bristol Bay Area, Southwest Alaska by Kreig, Fall, Chythlook, LaVine and Koster, http://www.adfg.alaska.gov/download/indexing/Technical%20Papers/Tp326.pdf

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CONSERVATION

Shifting habitat mosaics and fish production across river basins

Sean R. Brennan[1]*, Daniel E. Schindler[1], Timothy J. Cline[1], Timothy E. Walsworth[1], Greg Buck[2], Diego P. Fernandez[3]

Watersheds are complex mosaics of habitats whose conditions vary across space and time as landscape features filter overriding climate forcing, yet the extent to which the reliability of ecosystem services depends on these dynamics remains unknown. We quantified how shifting habitat mosaics are expressed across a range of spatial scales within a large, free-flowing river, and how they stabilize the production of Pacific salmon that support valuable fisheries. The strontium isotope records of ear stones (otoliths) show that the relative productivity of locations across the river network, as both natal- and juvenile-rearing habitat, varies widely among years and that this variability is expressed across a broad range of spatial scales, ultimately stabilizing the interannual production of fish at the scale of the entire basin.

The generation and maintenance of biological complexity over ecological and evolutionary time scales ultimately depend on processes that generate habitat heterogeneity across landscapes (*1*). Such heterogeneity is produced from interactions between local geomorphic features (e.g., topography) and environmental forcing (e.g., regional climate). Habitat can be described as a mosaic of environmental conditions arranged across landscapes but, importantly, the spatial configuration of habitat patches shifts through time as prevailing environmental conditions interact with geomorphology, successional processes, and the biological responses of locally adapted populations (*2*–*4*). This concept—the shifting habitat mosaic—has been empirically tested at small scales (*5*, *6*), but how these dynamics play out across a range of spatial scales has never been quantified, specifically in terms of how they influence the reliability of ecosystem services.

The argument to conserve biodiversity often focuses on ecosystem stability and how biologically diverse communities tend to spread the risk of collapse or poor performance (*7*–*9*). Less common, however, is to consider the continuum of spatial and temporal scales dictating the processes that generate ecosystem heterogeneity, its hierarchical structure, and thus, resilience. The concept of shifting habitat mosaics integrates how different dimensions of ecological diversity (e.g., habitat variation, locally adapted populations, and variable life histories) interact to contribute to resilience as ecosystems respond to a heterogeneous and ever-changing environment over a continuum of spatial and temporal scales. The persistence of biological communities at short (*5*, *6*) and long (*10*) time scales is ultimately linked to whether organisms have the ability to exploit shifting mosaics of environmental conditions in space and time. Thus, understanding how shifting habitat mosaics influence the reliability of ecosystem services is crucial, especially in the current era of rapid industrial and urban growth threatening biodiversity worldwide (*11*).

We quantified how shifting habitat mosaics influence the reliability of Chinook and sockeye salmon fisheries at the mouth of the Nushagak River flowing into Bristol Bay, Alaska by reconstructing production and migratory patterns of

[1]School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA 98105, USA. [2]Alaska Department of Fish and Game, Anchorage, AK 99518, USA. [3]Department of Geology and Geophysics, University of Utah, Salt Lake City, UT 84112, USA.
*Corresponding author. Email: srbrenn@uw.edu

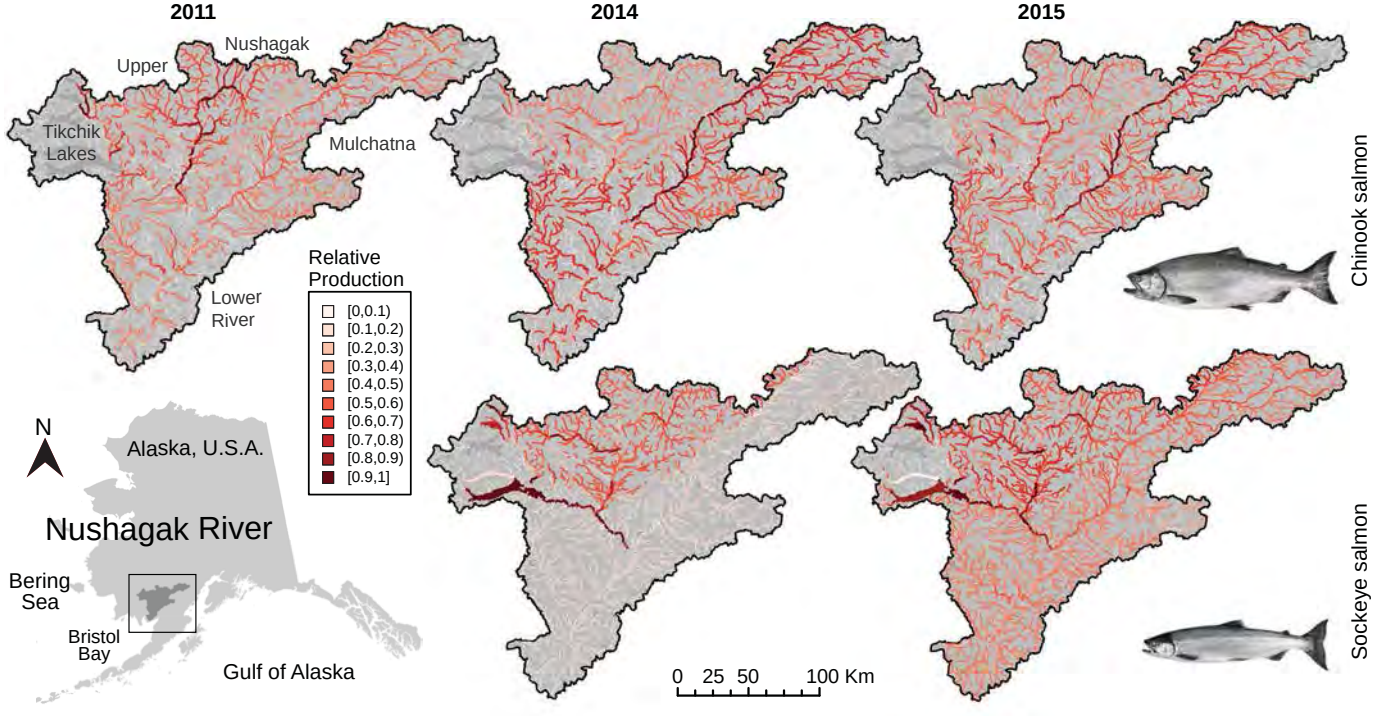

Fig. 1. Productive habitats for salmon shift across river basins. Areas of high Chinook salmon production in 2011 shifted from the upper Nushagak River to the Mulchatna River in 2014 and 2015. Sockeye salmon production was concentrated in Tikchik lakes in 2014 but was more evenly distributed in 2015 including across riverine habitats.

these species using strontium isotopic ($^{87}Sr/^{86}Sr$) variation across this watershed. Natal origins and movement patterns of juveniles were inferred from profiles of $^{87}Sr/^{86}Sr$ ratios recorded in otoliths of each species (*12*). Production and habitat-use patterns were reconstructed by calculating the most likely geographic locations of 1377 returning adult salmon (>250 fish per species per year) at each snapshot in time recorded by the otolith during each fish's juvenile freshwater residence (*12*). To do so, we quantified conditional probabilities of $^{87}Sr/^{86}Sr$ ratios, geomorphic habitat preferences, prior locations, and directional movements (*12*). Because otoliths grow proportionately with the length of fish, we could infer how habitat mosaics contribute to the total growth of fish before entering the ocean (*12*). By analyzing otoliths collected from individuals captured at the river's coastal terminus during annual returns in 2011, 2014, and 2015, our analysis spanned spatial scales ranging from the entire basin to individual streams (stream orders 3 to 9), and temporal scales including interannual variability in returns, the age structure of each year, and the months to years of habitat use during freshwater residence. This breadth of spatial and temporal scales provides a test of how shifting habitat mosaics influence fish-production patterns in free-flowing rivers.

The Nushagak River (35,000 km^2) flows into Bristol Bay, which is distinctive in the region for its vast riverine habitats in addition to large lakes. It is remote, pristine, and defined by substantial landscape heterogeneity. Physiographically, the basin is composed of four regions: the Tikchik lakes and the upper Nushagak, Mulchatna, and lower rivers. These are geologically and geomorphically distinct, generating variations in $^{87}Sr/^{86}Sr$ ratios, temperature, precipitation, and hydrology. Variation in how this landscape heterogeneity filters overriding climatic conditions generates a mosaic of habitats that contribute to the production of salmon. Furthermore, precise natal homing of adult salmon leads to a hierarchical, locally adapted population structure. Because $^{87}Sr/^{86}Sr$ ratios vary widely across the basin (fig. S1) and are temporally stable (*12*), the Nushagak River provides an ideal system in which to test how shifting habitat mosaics influence landscape patterns of fish production.

Chinook and sockeye salmon exhibited heterogeneous production patterns across the basin during each return year, and patches of high and low production shifted between years (Fig. 1). Regions of high Chinook salmon production in 2011 were in the upper Nushagak River in the northwest portion of the watershed. These shifted eastward to the Mulchatna River in 2014 and 2015. Similarly, the production of sockeye salmon shifted from being concentrated in the Tikchik lakes in 2014 to being more evenly distributed across both lake and riverine habitats in 2015. Spatial production patterns of both species also differed among the contributing age classes within return years (Fig. 2 and fig. S2). In 2014 and 2015, the production of freshwater age 0 sockeye salmon (salmon that spent <1 year in fresh water, i.e., "sea-/river-type" sockeye) primarily originated from riverine habitats compared with those fish that spent at least 1 year in fresh water, which are typically associated with lake habitats (i.e., "lake-type" sockeye salmon) (Fig. 2).

Juvenile Chinook and sockeye salmon also exhibited a variety of habitat-use strategies among return years to achieve growth in fresh water before migrating to the ocean (Fig. 3, A and E). For Chinook salmon, these different strategies resulted in patchy spatial patterns of juvenile growth, which shifted interannually (Fig. 3, I to K). In some return years, the distribution of total growth across the riverscape differed markedly from the natal production pattern that same year. For example, production of Chinook salmon in 2011 was concentrated in the upper Nushagak River (Fig. 1); the spatial pattern of total freshwater growth, however, was more evenly distributed with the Mulchatna River (Fig. 4I). The amount of growth achieved in the lower river was also much higher in 2014 relative to other years (Fig. 4, I to K).

We also quantified how individuals and populations differentially used the lower river as rearing habitat for accumulating growth as well as a migratory corridor to the ocean (*12*) (movie S1). Depending on the return year, between 8 and 20% of Chinook and sea-/river-type sockeye salmon exhibited forays in the lower river (e.g., Fig. 3, A to C), where they achieved between 10 and

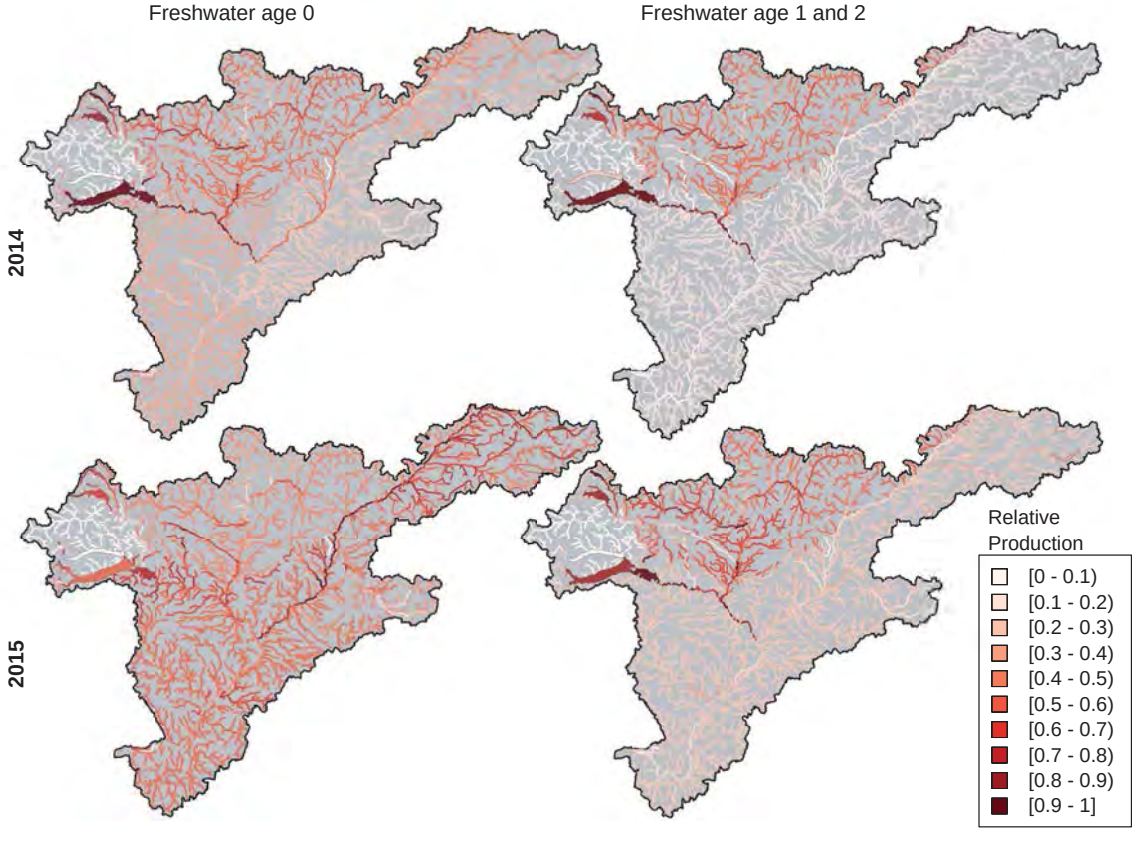

Fig. 2. Habitat and life history diversity interact to shape spatial production patterns. In 2014 and 2015, there was relatively high production of freshwater age 0 fish from riverine habitats.

50% of their total body mass before migrating to the ocean (Fig. 3, D and H). Furthermore, the infrequent use of the lower river by lake-type sockeye salmon (Fig. 3, D and H) illustrates how the strategy of using the lower river was not species specific, but rather was more related to the general life history of locally adapted salmon populations.

Interannual variability in the production of salmon from the Nushagak River ecosystem was maintained across the spatial hierarchy of the river network, indicating that a range of spatial scales contributes to variance dampening of salmon resources observed at the river basin scale (Fig. 4, A and B). For both species, we observed variance dampening from fine through aggregated spatial scales (stream orders 3 to 9). Deviations of these observations from a simulation of independent population dynamics (*12*) (Fig. 4, A and B) indicated that production dynamics are not random across the basin. Both species exhibited such deviations at intermediate stream orders, suggesting a strong interaction between the environment (Fig. 4, C to E) and large-scale habitat features that produced independent dynamics among their populations.

Habitat conditions conducive for survival and growth of salmon throughout the Nushagak basin likely vary as a function of how local geomorphic features filter prevailing environmental forcing. This heterogeneity enables the opportunity for juveniles to find suitable growth conditions among the array of habitat options that mosaics provide. Similarly, fisheries in Nushagak Bay benefit from favorable conditions persisting somewhere in the basin for at least one of the age classes exhibiting a particular habitat-use strategy. Freshwater habitats are linked to marine survival not only through the body size achieved by juvenile fish, but also through variation in the timing of their entry to the ocean and whether they meet favorable conditions (*13*, *14*). Correspondence among the spatial scales of environmental variation and shifts in production (Fig. 4, C to E) suggests that environmental heterogeneity plays an important role in shaping how growth and production of salmon vary among locations through time.

Our results demonstrate how multiple dimensions of biocomplexity operating across a continuum of nested spatial and temporal scales integrate to stabilize salmon production and fisheries at the scale of the Nushagak River watershed. Furthermore, we show that shifting habitat mosaics play out at large and intermediate scales in addition to the well-documented cases on small spatial scales for providing resiliency to ecosystem services.

Ultimately, entire landscapes are involved in stabilizing biological production. For conservation, and management more broadly, this makes it difficult to prioritize some habitats over others and emphasizes the critical role of evaluating multiple landscape-use scenarios in the face of increasingly uncertain futures (*15*). For the restoration of affected areas, it emphasizes the need to coordinate efforts across large spatial

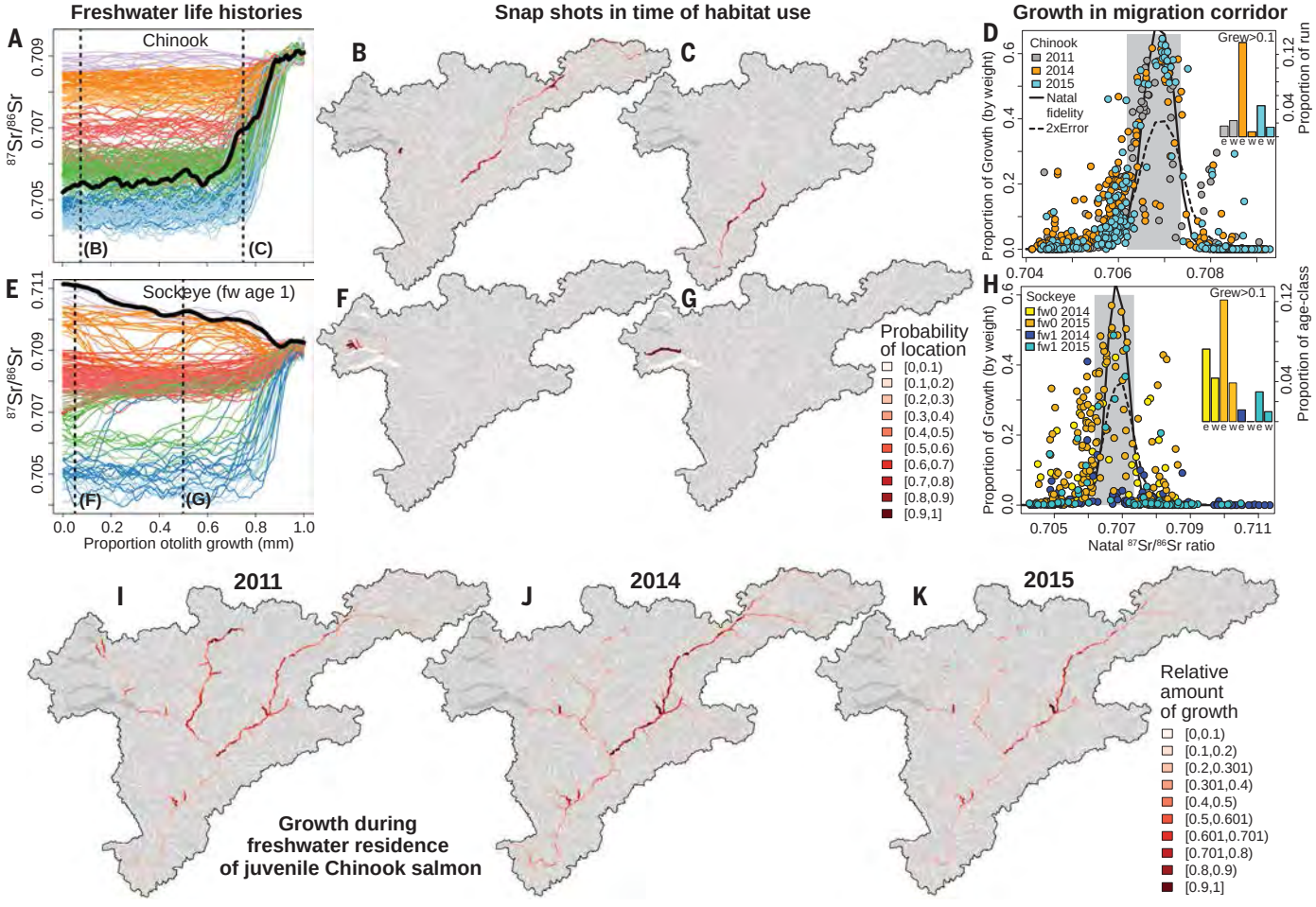

Fig. 3. Diverse freshwater life histories, use of migration corridors, and shifting patterns of growth. Freshwater life histories (**A** to **C** and **E** to **G**) and the amount of growth achieved in the lower river migration corridor of Chinook (**D**) and sockeye (**H**) salmon of the Nushagak River differed among return years ("e" and "w" correspond to fish originating from the eastern or western parts of the basin, respectively). Fish that plot above the black lines and outside of the gray box grew substantially in the lower river but originated elsewhere. Snapshots of habitat use (B and C, F and G) of individual fish [bold lines in (A) and (E)] correspond to positions in the otolith indicated by vertical dotted lines in (A) and (E). Isotope profiles [(A) and (E)] are color coded on the basis of each fish's natal $^{87}Sr/^{86}Sr$ ratio. (**I** to **K**) Spatial patterns showing how the total amount of freshwater growth (body mass) achieved by juvenile Chinook salmon was distributed across the basin and shifted among return years.

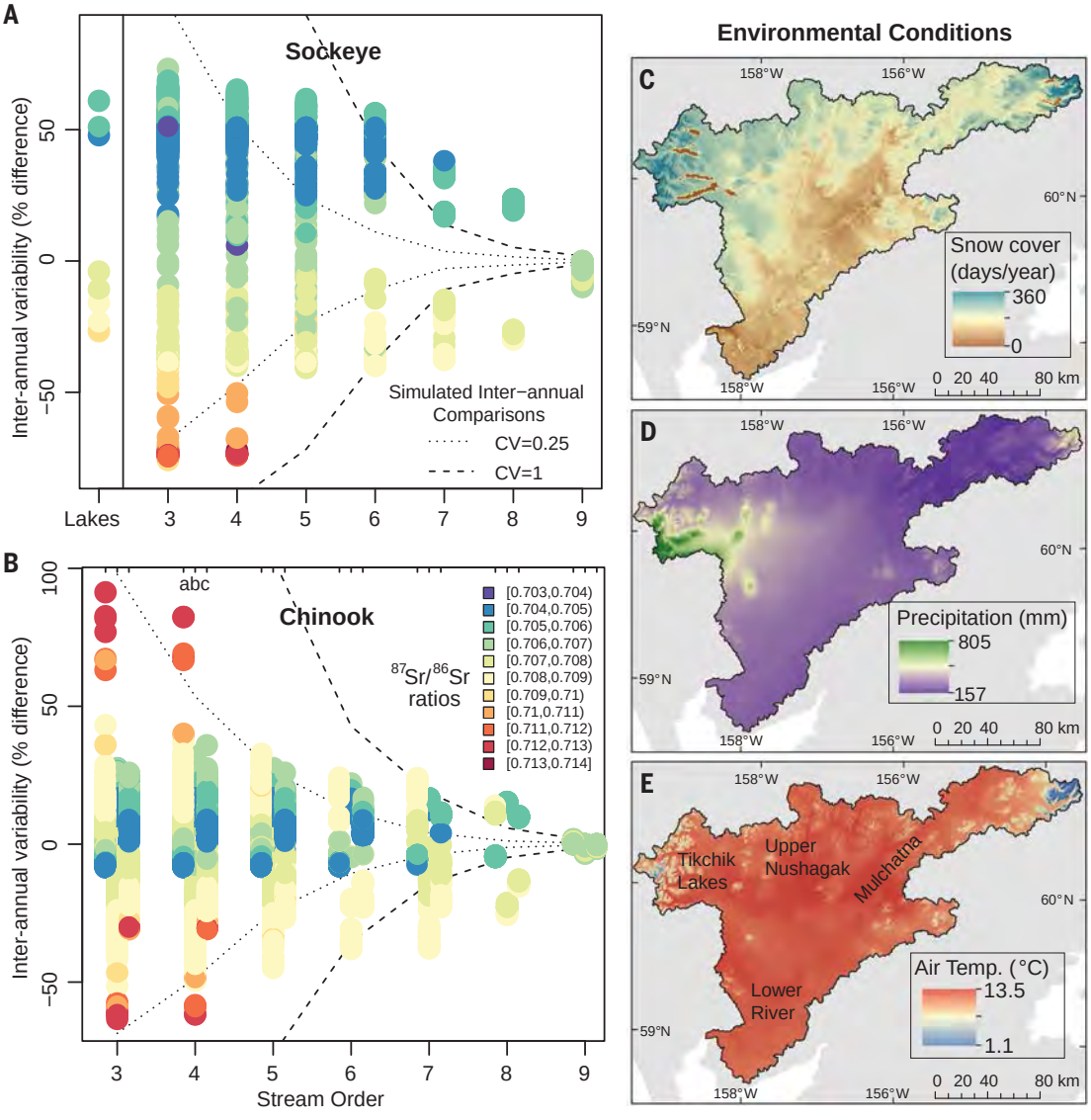

Fig. 4. Shifting habitat mosaics damp variance in production across nested spatial scales. Each spatial scale (stream orders 3 to 9) contributed to the reliability of Nushagak River salmon production. (**A**) Percentage difference in sockeye salmon production of each stream reach among return years aggregated by stream order. (**B**) Comparisons among Chinook salmon return years (a: 2014 versus 2011; b: 2015 versus 2011; and c: 2015 versus 2014). Dotted lines represent simulations in which each unique stream reach is an individual population with independent production dynamics. (**C** to **E**) Multiscale variability in environmental conditions: mean snow cover (days/year from 2011 to 2016) (C), decadal mean summertime precipitation amount (millimeters from 2000 to 2009) (D), and air temperature (°C from 2000 to 2009) (E).

scales and to avoid independent small-scale projects (e.g., tributary by tributary) (*16*, *17*). Such approaches are unlikely to restore a system's resiliency to the levels that we observe across intact landscapes and riverscapes.

Shifting habitat mosaics are a central feature of what makes ecosystems resilient. Because patterns of high and low production, or conditions most suitable for growth, shift among locations through time, the biological performance of a landscape tends to be more reliable at aggregate spatial scales (*1*, *8*). This means that conservation of the processes that generate and maintain heterogeneity and connectivity across landscapes (e.g., fires, floods, and migration) is as important as the biological communities that they support (*10*).

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SUPPLEMENTARY MATERIALS

science.sciencemag.org/content/364/6442/783/suppl/DC1
Materials and Methods
Figs. S1 to S5
Tables S1 to S16
Movie S1
References (*18*–*43*)

14 September 2018; accepted 26 April 2019
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Shifting habitat mosaics and fish production across river basins

Sean R. Brennan, Daniel E. Schindler, Timothy J. Cline, Timothy E. Walsworth, Greg Buck and Diego P. Fernandez

Science **364** (6442), 783-786.
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A portfolio of habitats

To conserve species, we must conserve their habitat. This concept is well known, but the reality is much more complex than simply conserving a particular area. Habitats are dynamic and vary across both space and time. Such variation can help to facilitate long-term persistence of species by allowing local movement in search of the best conditions. Brennan *et al.* clearly demonstrate the benefit of the habitat mosaic to Pacific salmon by characterizing how both climate and population productivity vary over time and space in an Alaskan river system.

Science, this issue p. 783

Curyung Tribal Council

P.O. Box 216 – 715 Seward Street
Dillingham, Alaska 99576
Phone: (907) 842-2384 - Fax: (907) 842-4510

March 30, 2020

Via Email to:

LTG Todd T. Semonite
54th Chief of Engineers
Commanding General, USACE
Todd.T.Semonite@usace.army.mil

The Honorable R.D. James
Ass't Sec of the Army (Civil Works)
U.S. Department of the Army
via ryan.a.fisher12.civ@mail.mil

Thomas J. Tickner, PMP
Brigadier General Commander, USACE
Pacific Ocean Division
Thomas.J.Tickner@usace.army.mil

Re: The Pandemic and the proposed Pebble Project (POA-2017-00271) – A Request for Help.

Dear LTG Semonite, Assistant Secretary James, and Brigadier General Tickner:

We write to elevate to you our request that the U.S. Army Corps of Engineers provide Curyung Tribal Council, a formal cooperating agency on the Corps' Environmental Impact Statement for the Pebble mine project , and Bristol Bay tribes and communities relief from grossly unreasonable deadlines established by the Alaska District of the Corps related to the proposed Pebble mine. We write with regret that our letter may distract you from fulfilling your important roles and responsibilities to help the nation respond to the ongoing pandemic emergency. Yet, we are compelled to write because the actions of the Alaska District, discussed below, are hampering our ability to fulfill our roles and responsibilities as we work to protect our tribal members and the Bristol Bay community from the threat of the pandemic.

Despite our best efforts, Curyung Tribal Council has not had sufficient time to perform a thorough review of the Preliminary Final EIS (PFEIS) for the proposed Pebble Project. As many of the cooperating agencies stated at the in-person technical meetings on the PFEIS held earlier in March, the time frame for input was already unreasonably, and inexplicably, short.

And then came the pandemic. On Thursday March 19, as the reality of the threat was coming into focus for us, Bristol Bay's tribal, corporate and seafood industry leaders requested that the Alaska District extend the deadline for cooperating agency comments on the PFEIS to beyond the pandemic emergency. Time spent focusing on PFEIS comments for the proposed Pebble mine meant less time for us to focus on what we needed to do to protect the health and safety of our tribal members and our own families.

The next day – Friday March 20 – the Alaska District sent a "REMINDER" email to the cooperating agencies, stating that the comments were still due on Monday March 23 and not addressing in any fashion the difficult circumstances in which we find ourselves and how they relate to the Corps' scheduling decisions. We then juggled PFEIS comment work with pandemic response work and our own necessary personal preparations, worked through the weekend, and submitted to the Alaska District what comments we could by close of business that day, knowing that our analysis was incomplete. After close of business that day, i.e. after we had spent days distracted from our pandemic response by the need to prepare comments on the PFEIS for the Alaska District, the District announced a meaningless one-week extension to the comment period.

Despite our tribal status and role as an expert cooperating agency, the Alaska District clearly does not appreciate or defer to our expertise on matters related to Bristol Bay. It also appears that the Alaska District is not aware of our history with pandemics. So that we can understand the context of our request through more than our own words (which should sufficient on such matters, but which apparently was not for the Alaska District), we attach to this letter a western-science-based article relaying Bristol Bay's experience with the Spanish Flu.[1]

In short, the Spanish Flu hit Bristol Bay with horrific force in the spring of 1919. Hundreds of adults died, many within mere days of contracting the disease. In many places children, largely spared by the flu, were left to fend for themselves until help arrived. Help came from what adults remained among the population, the commercial fishing industry, in particular the Alaska Packers Association, which operated many of Bristol Bay's canneries, and from Dr. Linus Hiram French, nurses Mayme Conley and Rhoda Ray at Dillingham's Kanakanak hospital. Their combined heroic efforts saved lives and hundreds of children orphaned by that pandemic. These orphans were the parents of many of our current elders, including many within our tribe. In fact, not one single tribal family is spared this pandemic history, and most of our tribal members are descended from an orphan of the flu. What may therefore be history to others remains an acutely personal experience for our tribal members and for many people still alive in Bristol Bay today.

As we hope you can now appreciate, our region's experience with the Spanish Flu pandemic deeply colors our reaction to the current coronavirus pandemic. And much like in the rest of the country, our medical facilities are not prepared to handle the potential influx of patients suffering from COVID-19. For example, the Kanakanak Hospital in Dillingham, where Dr. French and nurses Conley and Ray worked so tirelessly to battle the flu and help children in 1919, today has a mere 16 beds for a region that includes 26 villages and 7,000 residents, and routinely sends patients with significant respiratory challenges to Anchorage. Meanwhile, another Bristol Bay commercial salmon season is on the horizon, and Bristol Bay communities are confronting decisions about whether to allow and how to handle the influx of literally thousands of commercial fishermen and seafood processing workers.

So that we can focus on preventing the introduction and potential spread of coronavirus in Bristol Bay, we have set aside all other work, but, frustratingly, for Pebble, and will do so for an indeterminate time into the future. We are assessing needs, researching and debating appropriate health and safety protocols, participating in local, state and national pandemic response discussions and coordination efforts (with entities far too numerous to list), and making difficult decisions regarding how to protect our health and safety in the face of potential impacts to the commercial salmon fishery, which is our economic lifeblood.

[1] Attachment 1, Maria Gilson deValpine, Influenza in Bristol Bay, 1919: "The Saddest Repudiation of a Benevolent Intention," SAGE Open (January-March 2015), available at https://journals.sagepub.com/doi/pdf/10.1177/2158244015577418. See also Tim Troll, Bristol Bay Remembers: The Great Flu of 1919, published by Bristol Bay Native Corporation and Bristol Bay Heritage Land Trust (2019). The Anchorage Daily News published two articles by Mr. Troll published around the 100 year anniversary of that pandemic. These articles are also informative of our experience with pandemics, and are available here: https://www.adn.com/opinions/2018/12/29/a-century-ago-bristol-bay-battled-the-great-flu-at-christmastime/, https://www.adn.com/opinions/2019/05/10/hundreds-of-alaskans-died-of-the-flu-pandemic-a-century-ago-in-bristol-bay-hundreds-more-were-saved/.

Last week our tribe declared a Disaster and State of Emergency.[2] The City of Dillingham currently is in a similar decision-making mode, working through the difficult questions of what include in an emergency ordinance, and other tribes and communities have either passed or are considering similar extreme acts.

In this context we were incredulous at the response of the Alaska District to the request for more time, and with the hugely insensitive one-week extension. There is no question in our minds that the proposed Pebble mine poses an existential threat to Bristol Bay. As so many experts stated in the recent technical meetings on the PFEIS (and as we partially addressed in our March 23 comments) the science shows that the conclusion in the PFEIS that Pebble would not have a population-level impact on salmon is unsupported. Yet the Alaska District's time frame has prevented Curyung from providing our full input on the PFEIS to you, and we suspect has impacted the ability of other cooperating agencies to do so as well, given that they have highest-priority pandemic-related roles and responsibilities as well.

Pebble Limited Partnership clearly has no interest in slowing down despite the acute need of the people of Bristol Bay to focus on the pandemic. This is reflected in a recent myopic PLP press release, in which PLP states that it is "doing everything necessary to ensure" that the Corps grants a permit by "mid-2020."

Yet what should matter most is the Corps' position of sticking to what is to all appearances a wholly arbitrary schedule as opposed to crafting a schedule that allows for meaningful participation of and input from experts and stakeholders. Surely you can see what the Alaska District does not – that there is no national interest that justifies a schedule that forces a choice by Curyung and other tribes and people of Bristol Bay between working on pandemic response or the proposed Pebble mine.

We hope this letter sufficiently underscores to you the extreme insensitivity in this time of pandemic emergency of the Alaska District's refusal to meaningfully consider and extend the deadline for comments from cooperating agencies, and for other work on the Pebble permitting process that can distract anyone, anywhere, from focusing on pandemic response. Please rectify the situation by extending the deadline for cooperating agency input on the PFEIS, and other permitting benchmarks, until this national emergency has passed.

Sincerely,

Thomas Tilden
First Chief

Courtenay Carty
Tribal Administrator

Cc: Senator Lisa Murkowski, Senator Dan Sullivan, Representative Don Young, Col. Phillip Borders, Shane McCoy (Project Manager, Corps Alaska District).

Enclosures

[2] See attachment 2, Resolution 2020-11, Declaring A Disaster And State Of Emergency To The Global Covid-19 Pandemic And Non-Essential Travel Ban (March 24, 2020)

Article

SAGE Open
January-March 2015: 1–8

DOI: 10.1177/2158244015577418
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Influenza in Bristol Bay, 1919: "The Saddest Repudiation of a Benevolent Intention"

Maria Gilson deValpine[1]

Abstract

The 1918 influenza pandemic has been blamed for as many as 50 million deaths worldwide. Like all major disasters, the full story of the pandemic includes smaller, less noted episodes that have not attracted historical attention. The story of the 1919 wave of the influenza pandemic in Bristol Bay Alaska is one such lost episode. It is an important story because the most accessible accounts—the Congressional Record and the Coast Guard Report—are inconsistent with reports made by employees, health care workers, and volunteers at the site of the disaster. Salmon fishing industry supervisors and medical officers recorded their efforts to save the region's Native Alaskans in private company reports. The federal Bureau of Education physician retained wireless transmission, reports, and letters of events. The Coast Guard summarized its work in its Annual Report of 1920. The independent Bureau of Fisheries report to the Department of Commerce reveals the Coast Guard report at striking odds with others and reconciles only one account. This article explores the historical oversight, and attempts to tell the story of the 1919 wave of the pandemic which devastated the Native Alaskan population in this very remote place.

Keywords

1918 influenza pandemic, indigenous health, Alaska history, health disparities, ethics

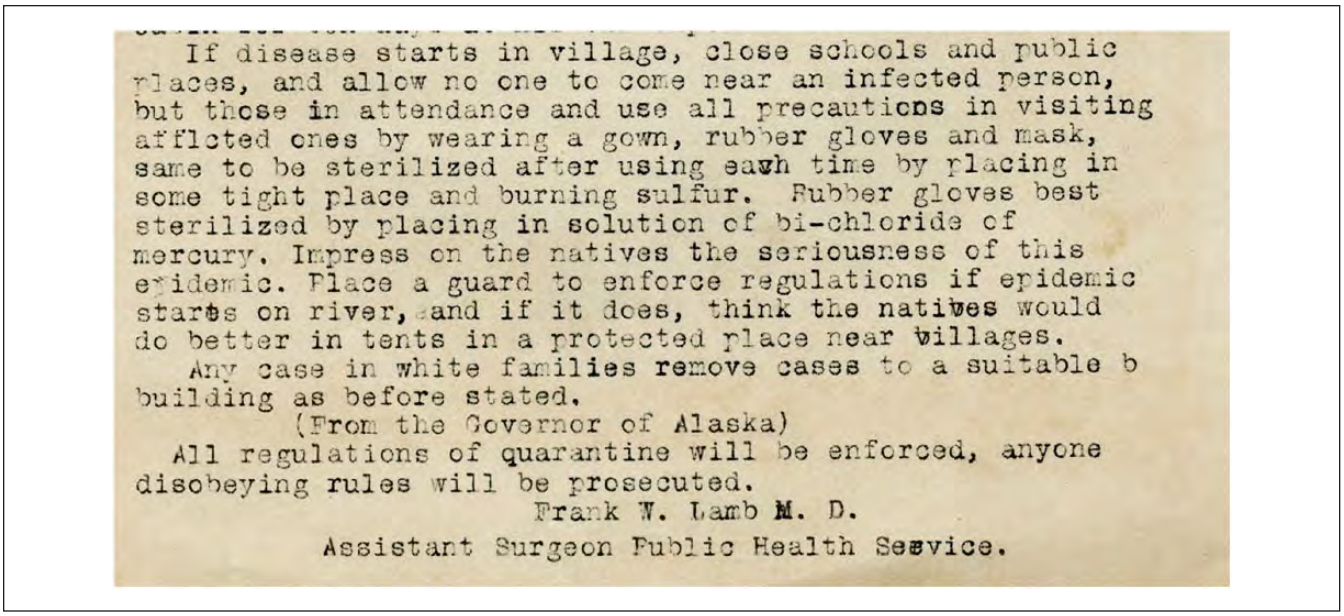
The 1918 Spanish influenza pandemic has been blamed for as many as 50 million deaths worldwide (Niall, Johnson, & Mueller, 2002) earning it the designation as the "greatest medical Holocaust in history" (Waring, 1971, p. 33) and "the mother of all pandemics" (Reid, Taubenberger, & Fanning, 2001, p. 81). Like all major disasters, the full story of the pandemic includes smaller, less noted episodes that have not attracted historical attention. The story of the 1919 influenza pandemic in Bristol Bay Alaska is one such lost episode. It is an important story because the most accessible accounts—the Congressional Record and the Coast Guard Report—are inconsistent with reports made on scene. This article is an attempt to remedy this historical oversight.

In the spring of 1919, the adult Native population in Bristol Bay was decimated by influenza (VanStone, 1967). The Native Alaskan population in the region at the time numbered approximately 1,000 people, living a subsistence lifestyle in barbaras or sod huts and traveling to fish camps in the spring. Weather conditions preclude travel in and out of the region from September to May, and the Native Alaskan population, with a few federal/territorial employees and salmon industry winter watchmen, were completely isolated from the outside world for 8 to 9 months each year. Because of its remoteness, the region had escaped the first wave of the 1918 pandemic. However, as the ice melted in 1919 and preparations for fishing season began, the dead, the dying, and the orphaned were discovered in appalling numbers.

Two major institutions recorded attempts to mitigate the disaster. The Coast Guard, reporting on its efforts in the 1920 Congressional Record (United States Senate, 1920) and its own Annual Report, was authorized and funded to respond (United States Coast Guard, 1920). The Alaska Packers Association (APA) responded incidental to preparations for the salmon fishing season, maintaining private company reports from several sites in the Bay. A startling contrast, however, exists between the reports of the rescue. The Bureau of Fisheries of the Department of Commerce, reporting independently on the fishery, reconciles only the APA reports, calling the Coast Guard efforts "the saddest repudiation of a benevolent intention" (Baker, 1919, p. 4).

[1]James Madison University, Harrisonburg, VA, USA

Corresponding Author:
Maria Gilson deValpine, James Madison University, MSC 4305, 820 Madison Drive, Harrisonburg, VA 22807, USA.
Email: devalpmg@jmu.edu



If disease starts in village, close schools and public places, and allow no one to come near an infected person, but those in attendance and use all precautions in visiting afflicted ones by wearing a gown, rubber gloves and mask, same to be sterilized after using each time by placing in some tight place and burning sulfur. Rubber gloves best sterilized by placing in solution of bi-chloride of mercury. Impress on the natives the seriousness of this epidemic. Place a guard to enforce regulations if epidemic starts on river, and if it does, think the natives would do better in tents in a protected place near villages.

Any case in white families remove cases to a suitable b building as before stated.

(From the Governor of Alaska)

All regulations of quarantine will be enforced, anyone disobeying rules will be prosecuted.

Frank W. Lamb M. D.

Assistant Surgeon Public Health Service.

Figure 1. Excerpt from "Instructions for Treatment" and quarantine orders.
Source. National Archives, Anchorage, Alaska, Record Group 75.

Disease Control in "an American Colony"

In what Haycox refers to as "an American colony," the U.S. government was responsible for the maintenance of Native Alaskans (Haycox, 2006, title). The Natives, however, were exceedingly vulnerable to disease, having suffered the devastation of their culture and society from colonial administrations beginning with the Russian Period and extending into statehood (Crosby, 1989; Haycox, 2006). Even so, industrial and governmental roles often overlapped in this under-resourced and harsh place. Bristol Bay is the largest sockeye salmon fishery in the world and the source of both Native subsistence and American commercial fishing interests. As part of the commercial enterprise, the APA (1919) provided physicians, nurses, and hospitals for Native employees and their families during the fishing season. The Coast Guard also performed its Annual Survey of the region in summer, providing incidental health care services. In the 1919 season, the Coast Guard was authorized and funded to care for and provision residents of the Alaska Territory during the influenza pandemic (United States Senate, 1920).

The Federal Bureau of Education educated and employed Native Alaskans through the Territorial School Service, and associated domesticated reindeer herds. Teachers initially provided limited health care services, but eventually the Bureau of Education hired nurses and doctors employed by the fish canneries in the same locations. Physicians, in particular, were often recruited as federal representatives, first as Bureau of Education Commissioners, and later with the Indian and Public Health Services. Kanakanak School in Bristol Bay—staffed by a former cannery physician and two Bureau of Education nurses—served first as the school, then the hospital, and, eventually, the orphanage during the 1919 pandemic (Bristol Bay Area Health Corporation, 2003).

By the time of the events described here, the United States had extensive experience with the pandemic. In 1918, U.S. Commissioners nominated deputies in Bristol Bay (French, 1918). Quarantine authorization was established and medical instructions distributed (see Figure 1; Lamb, 1918). Territorial Governor Riggs instituted shipping quarantines in mid-October (Riggs, 1919). Fortuitously, however, weather embargoed the ports, and the influenza raging in San Francisco and Seattle did not affect remote Southwest Alaska until 1919. With the spring ice break-up and resumption of shipping, the opportunity to prevent transmission was lost. Arriving in May for the 1919 fishing season, APA representatives found the influenza preceded them. The fast moving epidemic arrived from Unalaska, 500 nautical miles down the Aleutian Chain, in mid-May, and its lethal effects were apparent by the APA's May 19th arrival.

Three Stories: A Rashomon

Three sources give differing accounts of the 1919 influenza epidemic that raged in Bristol Bay from May 19th to late July, 1919. Three APA Superintendents kept season chronologies at Nushagak, Naknek, and Kvichak Stations (each station was comprised of two to five canneries or salting facilities around the Bay). Three APA medical officers wrote summaries of the season's events. The six documents were compiled in October, 1919, into the *Report on 1919 Influenza*

Epidemic: Naknek Station, Nushagak Station, [and] Kvichak Station, Bristol Bay Alaska under the auspices of the APA in San Francisco. The APA also published a public relations pamphlet titled *The True Measurement of Any Institution Lies in the Service it Renders* in 1922, in which the APA (1922)

> seeks to give the public a true picture of a side of its Alaska organization of which nothing has heretofore been said and of which few except those who are closely associated with it or its plants have any knowledge. (p. 1)

The *Service* document is largely a reiteration of the *Report on 1919*, with the strongest criticisms of the Coast Guard deleted.

U.S. Coastguard ships on their annual survey went north to Alaska when the ice broke up in April 1919, authorized to provide relief and provision residents on the Alaska Peninsula and the Aleutian Chain. The USSS Unalga, Marblehead, and Vicksburg spent late April through early June in Unalaska reporting on efforts to combat influenza there, arriving on June 19th, in Bristol Bay. The *Annual Report of the United States Coast Guard for the Fiscal Year Ended June 30, 1920* summarizes the report of Captain Dodge, Commander of the Unalga. The same report is excerpted in the 1920 Congressional Record.

The Department of Commerce Bureau of Fisheries Warden for Bristol Bay, Shirley Baker, traveled on the APA Steamer Nushagak from San Francisco to Clark's Point in Nushagak Bay, arriving to report on the 1919 fishery's prospects on May 19th. The Warden's letter also reported on the condition of the Natives, and the APA, Bureau of Education, and Coast Guard actions during the epidemic. An independent observer, Warden Baker became an inadvertent witness to the evolving crisis and controversy in the Bay.

The Coast Guard's Cruises in Northern Waters

The 1920 Coast Guard *Annual Report* chapter, *Cruises in Northern Waters*, describes its activities in Alaska in the spring and summer of 1919. The Coast Guard summarizes "the valiant service . . . rendered to the natives and others who were stricken down during the terrible scourge of influenza," focusing on the epidemic at Unalaska (United States Coast Guard, 1920, p. 31). Captain Dodge, the Unalga's Commander, praised the virtues of "the force attached to the cutter [which] sacrificed every bodily comfort, risked health, and even seriously hazarded their lives" (United States Coast Guard, 1920, p. 25), claiming the Coast Guard's timely arrival prevented greater loss of life and "contributes an illuminating chapter to the history of the establishment [the Coast Guard]" (United States Coast Guard, 1920, p. 31).

The Coast Guard cutter Unalga sailed from Seattle on April 30, 1919, having stayed in port there for 10 days acquiring provisions. It then stopped in Southeast Alaska to deliver supplies and carry "passengers from place to place and performing other services incident to her cruise" (United States Coast Guard, 1920, p. 31), meandering north toward the Aleutian Chain and the Alaska Peninsula. It stopped but did not stay at Unalaska on May 19th, leaving after 1 day and weathering over on Akun Island. On Akun, it received a wireless appeal for assistance advising "that the Spanish Influenza had broken out in Unalaska and become epidemic." Returning to Unalaska, "the situation was so serious that Capt. Dodge decided to remain on the ground and afford such medical relief and succor as his force and the facilities of his vessel could supply" (United States Coast Guard, 1920, p. 25).

A week later, the Bureau of Education's physician at Nushagak, Dr. Hiram French, also wired for help, informing Captain Dodge that "influenza was raging throughout the Bristol Bay district" with "sixty or more deaths . . . [and] . . . no help available to care for the sick or to bury the dead" (United States Coast Guard, 1920, p. 25). Captain Dodge, "explaining to [Dr. French] why he could not, for the present, respond to his call for help," remained in Unalaska where the wireless operators, White families, teachers, and the government physician were "prostrated by the disease" (United States Coast Guard, 1920, p. 25). The USSS Vicksburg and Marblehead relief ships had also arrived at Unalaska, all three ships staying for the duration of the epidemic there.

Captain Dodge's health and the situation having improved in Unalaska, another appeal came by wireless from Bristol Bay, this time from the APA's Naknek Station requesting help for the Natives at nearby Ugashik, all of whom were "sick with influenza, 12 deaths to date: some [white] winter men also affected; can you assist at that station; we can handle situation here at Naknek" (United States Coast Guard, 1920, p. 28). Although the Unalga was able to maneuver quickly at Akun, Captain Dodge decided to sail to Bristol Bay only on June 16th. After moving medical units between ships, the "Unalga steamed out of Unalaska on the afternoon of the 17th bound for the Nushagak River," arriving at anchor in Dillingham on the evening of the 19th of June (United States Coast Guard, 1920, p. 28), two and a half weeks after the request for assistance and well beyond the peak of the epidemic at both Unalaska and Bristol Bay.

Captain Dodge and his medical staff met with Dr. French at Kanakanak School where they were apprised of 300 sick and dying Natives in neighboring villages and 100 orphans newly transported to the site. A medical party went ashore "on the evening tide" to survey victims at Coffee Point, "where the disease had found a large number of victims" (United States Coast Guard, 1920, p. 29). A detail was also sent ashore "to bury the dead and to shoot stray dogs, a number of which had been feeding upon the bodies of persons who had died unprotected and alone in isolated localities" (United States Coast Guard, 1920, p. 29). Captain Dodge summarizes this first foray finding that "practically all adult

natives of that place [Nushagak] had died . . . Also 12 orphan children entirely without protection," for which arrangements were "promptly made" at the school, now orphanage, in Dillingham(United States Coast Guard, 1920, p. 29). The burial party returned having buried those "partly eaten by dogs," and "shot all dogs seen" (United States Coast Guard, 1920, p. 29). On subsequent days, medical and burial parties visited villages on the eastern side of the bay, moving the ill and orphaned when found and "carried thither" to Dillingham, (United States Coast Guard, 1920, p. 29), and necessitating one more mention, at length, of the dogs:

> At one of the settlements visited, the entire population, numbering 7 persons, had died, and the native dogs had stripped their bones. The remains were gathered up and buried. The dogs, as ravenous and ferocious as wolves, promptly attacked the visitors, but the good marksmanship of the detail put an end to them before they could do anybody injury. (United States Coast Guard, 1920, p. 30)

On June 28th, "the services of the relief force being no longer required . . . her work in this district concluded, the Unalga left Nushagak Bay . . . for Unalaska" (United States Coast Guard, 1920, p. 30).

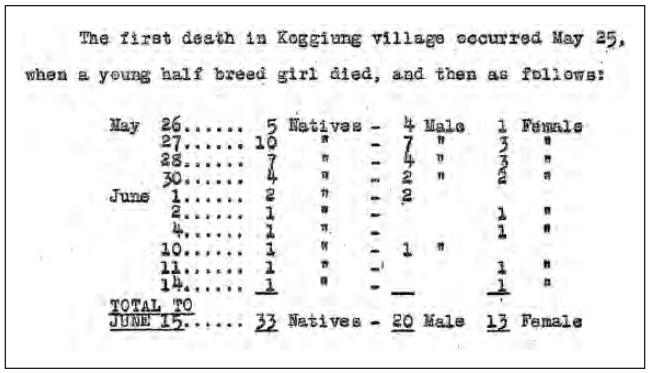
The Coast Guard report concludes with a characterization of Captain Dodge and his crew, "indefatigable in the efforts to relieve suffering," regardless of the "most menial work" and they are commended by the Secretary of the Treasury, in return,

> it is just such accomplishments as these for the cause of humanity that have given the coast Guard its high place among our Federal institutions, and the record of the Unalga on this occasion adds another brilliant chapter of endeavor to the annals of the service. (United States Coast Guard, 1920, p. 30)

The Alaska Packer's Association: *Report on 1919 Influenza Epidemic*

On May 19th, the same day the Unalga landed at Unalaska, the APA Steamer Nushagak landed at Clark's Point in Nushagak Bay, which drains into the larger Bristol Bay. A winter watchman reported the influenza had been brought to Nushagak by a Russian Priest from Unalaska, who held services, "attended by virtually every adult Native in the Bay" in mid-May (APA, 1919, p. 27). The disease had spread across Nushagak Bay by the time of the APA's arrival, and the peak of the epidemic can be seen in the data collected daily by the Kvichak Station Superintendent, J. C. Bell and his medical officer, Isaac B. Wilson (Figure 2). U.S. Commissioner William Neilsen, at Naknek, convalescing from the flu, reported that the epidemic arrived at Kvichak Bay on May 22 (APA, 1919).

The Nushagak Station medical officer wrote that "the influenza had been epidemic throughout the Nushagak district for about a week," by May 19. "Practically all of the



The first death in Koggiung village occurred May 25, when a young half breed girl died, and then as follows:

May	26.....	5	Natives -	4	Male	1	Female
	27.....	10	" -	7	"	3	"
	28.....	7	" -	4	"	3	"
	30.....	4	" -	2	"	2	"
June	1.....	2	" -	2			
	2.....	1	" -			1	"
	4.....	1	" -			1	"
	10.....	1	" -	1	"		
	11.....	1	" -			1	"
	14.....	1	" -			1	"
TOTAL TO JUNE 15.....		33	Natives -	20	Male	13	Female

Figure 2. Alaska Packers Association medical officer's mortality frequency table.
Source. Alaska Packers Association (1919).

residents, both white and natives," were ill, and a "considerable number" had died already. "Medical supplies, food and fuel were scarce" (APA, 1919, p. 35). Nushagak Station medical officer, E. B. Robinson found Ekuk Village, a "small place in a deplorable condition." He left food and supplies, "in care of Mrs. Hansen, herself formerly a trained nurse" to care for the remaining Natives (APA, 1919, p. 28).

Quarantine was an immediate concern, complicated by the seasonal subsistence fishing migration, most of the Natives having just left for fish camps leaving "not a great many in the Koggiung village—only about sixty" (APA, 1919, p. 33). The Kvichak Station Superintendent wrote on May 23 that "immediate measures for its [the epidemic's] control were taken" (APA, 1919, p. 33), but wired the U.S. Marshall at Naknek asking whether he had authorization to restrict Native travel: "This is very necessary. I have a man acting here now but without authority." The Marshall replied that he did not have authority but was requesting it, having "notified office of conditions but have not heard anything" (APA, 1919, p. 34).

APA physicians noted that " . . . the few natives not sick were sitting listlessly around in the cold dirty huts . . . only waiting resignedly to get sick, as is their custom when epidemics are raging" (APA, 1919, p. 21). Whites were also suffering and dying: "Mrs. Fred Blonde, Jr., age 23" and "Mrs. Mike Nergusen, age 42" both died at Clark's Point early in the epidemic (APA, 1919, p. 21). Linus Hiram French, the U.S. Commissioner for the Bureau of Education and the doctor at Kanakanak Hospital, also came down with the flu and was unable to provide assistance both because he was ill and because he "had more sickness and deaths at Dillingham than he could attend to" (APA, 1919, p. 36). Dr. French requested assistance in the meantime from the Unalga, telling the APA, "have no help here available to send . . . We have the same conditions at Nushagak with probably fifty deaths. I will wire immediately for assistance from outside" (APA, 1919, p. 36). However, the Superintendent at Kvichak Station had already wired Captain Dodge and "received no reply" (APA, 1919, p. 36).

On June 3, the Red Cross at Seward contacted the Naknek Station Superintendent asking for details of the epidemic and offering assistance. By this time, there were already a number of orphans from the epidemic, and the APA had made arrangements to care for the foundlings at the hospitals established at the Native villages around the canneries. J. F. Heinbockel wired back to the Red Cross that "children at Naknek were being well cared for" and assistance was not requested (APA, 1919, p. 4). That decision, however, was informed by the 1,100 mile sea voyage or 300 mile portage over Lake Iliamna required for the Seward Red Cross to offer such assistance. The Superintendent wired the Unalga on the same day requesting assistance for Ugashik village: "Can you assist at this station? We can handle situation here at Naknek at present" (APA, 1919, p. 4). "No answer was ever received to this message" (APA, 1919, p. 5).

The APA's June 4th discovery of three sick children and two dead adult Natives drifting in a "funeral boat" off Naknek is still referred to at Kanakanak Hospital (Alaska Packers Association, 1922, p. 5). Locating Native orphans before they starved was imperative. Fred Blonde, the winter watchman who lost his wife to influenza at Clark's Point, was assigned with Edward Smith, an APA nurse, to care for the orphans found by Captain Olaf Hemming of the Star of Iceland, in late May. "Most pitiful was the condition of the poor starved and filthy children . . . covered in reeking vermin . . . crying, huddled about their dead [parents]" (APA, 1919, p. 21). Hospital tents with orphanage facilities were raised, and existing buildings remodeled to accommodate the orphans found in every village surveyed. Surviving adult Natives were "nursed and fed until they could walk to the cannery for their meals" generally for "the entire season" (APA, 1919, p. 22).

On June 23, the Kvichak Station Superintendent received a report of 20 unburied bodies and the possibility of orphans at Lake Iliamna, a 4-day 82 mile journey upriver. The Coast Guard Cutters having arrived 4 days previously were requested to make the journey, the APA lacking low draft vessels for a river journey. Lieutenant Fielder and staff took a boat and provisions but returned after 30 hr, indicating to J. C. Bell "that no effort had been made to carry out the work to find and bury the dead" (APA, 1919, p. 38). Furthermore, Lieutenant Fielder reported back that no bodies had been found. J. C. Bell requested confirmation of the situation via Commissioner Neilsen and a nearby cannery:

> At Hermans Trading Station there was one woman in tent between the bank and village. Lying under a raincoat was a man and a boy and many lying on the bank. Also there were four or five bodies six or seven miles above Reindeer Station. (APA, 1919, p. 38)

By late June, the Coast Guard's unresponsiveness and the APA's lack of authority strained the relationship and dissembling over the dead upriver commanded J. C. Bell's attention:

> After Lieutenant Fielder, Dr. Woodruff and their expedition had returned from up the river, I met them in the Alaska Packers Association's hospital, and in presence of . . . witnesses, informed them that without authority I had assumed the quarantining and policing of the district, had taken the responsibility of care of the sick, burial of the dead, cleaning, clothing and supporting the orphans, feeding the entire village and other work of similar nature. I then requested that as the Marblehead expedition represented the United States Government, the entire proposition would be turned over to it, that the Alaska Packers Association's employees would be taken away from the village and from the Isolation Hospital, the food patrol stopped and from then on the entire relief to be handled by the Government. At the same time I told Lieutenant Fielder and Dr. Woodruff that I was firmly convinced from what they had done so far, or, rather, what they had failed to do, that they were not serious in their intentions to carry out the relief work. Lieutenant Fielder assured me if he could personally visit his ship and consult with the Commander that he was positive that the Commander would promptly institute measures to take this situation off my hands. (APA, 1919, p. 39)

The APA did not hear from Lieutenant Fielder or Dr. Woodruff again. The Coast Guard relief cutters set sail on June 25th or 28th, depending on which source is used. Subsequently, J. C. Bell learned that Lieutenant Fielder, eager to leave, sent the following telegram to the Marblehead: "Conditions on the Kvichak River satisfactory. Natives dead and buried. No children. Conditions warrant our return to ship. (Signed) Fielder" (APA, 1919, p. 40). In a scathing July 5th letter, J. C. Bell reported to San Francisco,

> We have not been able to fathom whether the conditions were satisfactory to them or to the natives who are dead and buried. At any rate that is the last we have heard of them. *And as usual the job is up to the Alaska Packers Association.* (APA, 1919, p. 41, italics in the original)

The Bureau of Fisheries Letter

The Bureau of Fisheries Warden Shirley Baker sailed from Seattle to Bristol Bay on the APA's Steamer Nushagak, arriving on May 19th, a week after influenza reached the region from Unalaska. He filed his "report of the general operations for the fishing season of 1919," with the Department of Commerce on November 16th, and through the letter reported on the fishery, Warden Baker was immediately caught up reporting on the rescue of the Natives (Baker, 1919, pp. 1-7). Describing the "Flu Plague" that "threatened the utter extinction of the entire Eskimo population," Warden Baker describes the region in a "demoralized condition" and the Natives without the "power of resistance to fit them to cope" (Baker, 1919, p. 1). The hospital was overcrowded, the "dead were lying unburied in the barabas [Native dugout dwellings]" and "half-starved children" in the dwellings "with the badly decomposed bodies of their elders." As was characteristic of the W-shaped pandemic, "these children died only"

Return to Excerpt

rarely; "it was the young people and the adults that felt the full force of the plague," dying shortly after infection (Baker, 1919, p. 2).

Warden Baker and his assistant, Lemuel C. Wingard, worked on the relief effort at Clark's Point where they first anchored, and on the other side of the Nushagak River, at Kanakanak Hospital in Dillingham, "with a little assistance, the U.S. Deputy Marshall and I interred almost the entire adult population of the Eskimo village of Kanakanak" (Baker, 1919, p. 2). He reiterated the dramatic dog-eating episodes mentioned in the APA 1919 report, as well as the heroic dog shootings in the Coast Guard report, but avoided further elaboration saying "conditions were too harrowing to narrate in this report in detail" (Baker, 1919, p. 2).

In a long paragraph titled "Operations of the U.S.R. Cutter Relief Service During 'Flu' Plague," Warden Baker described the Coast Guard dispatch of medical personnel and supplies as "sincere in its intention," yet he was "sorry to have to inform" that the "relief work was a failure in all the region where its operations—or rather lack of operations—fell under [his] observation." Anchoring off a "stricken village," the Unalga landing parties paid "little or no attention" to the "sick and dying Eskimos." Instead a "desperate hunt was kept up for souvenirs," invading Eskimos' homes, and rifling their possessions in acts "bordering on vandalism" (Baker, 1919, p. 2). The Coast Guard staff and medical personnel displayed a "callous disregard" for the "sick and dying Eskimos to whom they had been sent to minister . . . " (Baker, 1919, p. 2). After the APA established a Native hospital at Koggiung village, the relief cutter sent a landing party ashore, according to Warden Baker, to "relieve [the APA] of the great responsibility" of caring for the Natives as was their charge. Instead, the physicians, and "particularly the nurses" remained only briefly, "declaring that the natives were 'too dirty,' and after looking around the village for souvenirs and furs" returned to their ship (Baker, 1919, p. 2).

The same "distressing failure on the part of those on board the cutter whose duty it was" to treat the victims was displayed at the government hospital and orphanage at Dillingham. According to Warden Baker, the Coast Guard nurses invited two Bureau of Education nurses "to a dance on board the cutter that evening" (Baker, 1919, p. 3). Nurses Ray and Conley "declined the invitation," and described working conditions during the epidemic to Warden Baker. They

> had been working practically night and day for weeks on end—doing all the janitor's work, the cooking for the entire hospital, all the nursing and caring for a number of children and babies whose parents were either dead or dying—on duty until 11 p.m., and getting up thereafter during the night to attend to babies and sick parents urgently demanding attention (Baker, 1919, p. 3).

The Coast Guard nurses "who should have come ashore to help, went back the following day to dance" (Baker, 1919, p. 3). Hospital staff rejected subsequent offers of help from the Coast Guard: The Bureau of Education nurses "did not care to be bothered [further] with them in the crisis existing" (Baker, 1919, p. 3). Warden Baker amends his narrative to exclude the Coast Guard physician who "seemed to have a high moral sense of obligation" and briefly took over the running of the hospital. Mr. Baker further commends Bureau of Education nurses Conley and Ray for their "strikingly effective service . . . and devotion to duty" describing such service as "of a very high order" and deserving of medals if it had been performed "on the field of battle" (Baker, 1919, p. 3).

Warden Baker's distress extended from the Coast Guard's actions to the resources expended "in order to give aid to those most unfortunate Eskimos in the astounding calamity that had swept over them" (Baker, 1919, p. 4). Physicians and nurses were well paid and "expensive Red Cross supplies intended to alleviate suffering at the hospitals and Native villages were either not distributed or ineffectively so." Warden Baker's report on the relief efforts concludes, "the abject failure of the [relief] expedition . . . is the saddest repudiation of a benevolent intention that I have ever heard of or seen" (Baker, 1919, p. 4).

"The Saddest Repudiation of a Benevolent Intention"

The Bureau of Education had facilities and staff on the ground in Bristol Bay. Funding for large-scale, emergent efforts, however, was a problem in the Territory. Territorial Governor Riggs requested funds to combat the epidemic in early 1919. The Congressional Committee on Appropriations Resolution 199 reveals bickering over the amount spent in Alaska and the uses to which it was put. The Public Health Service complained that the $1 million awarded to it was to be spent on medical services, not "furnishing relief for destitution." For such a disease at the time, however, food, water, and basic nursing care, or "relief for destitution," were instrumental to survival (United States Senate, 1919, p. 16). The Public Health Service noted doctors and nurses were not to be had in Alaska, having already been furnished and sent north by the Coast Guard.

Congress appropriated $100,000 in 1918 for relief in Alaska, but it was for Coast Guard, not Bureau of Education, use. Ironically, news reports depicted the Coast Guard relief cutters steaming into Bristol Bay on June 7th, while they remained ensconced in Unalaska on the downside of the epidemic there (*Helena Independent*, June 16, 1919). A July 15th note in the *Oakland Tribune* quotes one R. C. Weightman of the Unalga, "epidemic conditions in the Nushagak region of Bristol Bay were not serious at present" (Editor, 1919). Conditions were no longer serious because the epidemic was over and the adult Native population expired.

Journeying up the coast in April, there is no indication that the Coast Guard planned to engage in large-scale relief exercises. The Coast Guard report describes in detail the epidemic

at Unalaska, but gives very little information of its trip in Bristol Bay. The Coast Guard stayed at Unalaska until the epidemic was largely over, arriving in Bristol Bay near the end of the epidemic there, although assistance had been requested on at least three prior occasions. The APA recorded the relief cutters' visit to Clark's Point Native village on the eastern side of Nushagak Bay—the same day as the Coast Guard's western village survey, burials, dog shootings, and orphan collections—where they decided "nothing needed their attention" and left (APA, 1919, p. 23). The Coast Guard makes no mention at all of the events near Lake Iliamna, where the conflict between it and the APA ended in confrontation and abandonment.

The APA, arriving at the ascendant curve of the epidemic in Bristol Bay to prepare for fishing, instead set up hospitals, established quarantines, surveyed villages, buried the dead, collected orphans, and dropped 50 tons of provisions. The rapid initiation of private quarantines first raised the question of authority and responsibility for the relief efforts. The 1922 APA *Service* document commends company action in particular for rescuing the orphans, "with no thought of recompense" (APA, 1922, p. 23) and reiterates the problem of authority and responsibility in a closing letter dated November 17, 1919, from Alaska Territorial Governor Riggs to Henry Fortnam, President, APA, "The government has been very lax in taking care of its wards and the epidemic ending January cost the Territory some hundred thousand dollars . . . " (APA, 1922, p. 33).

Alfred Crosby (1989) characterized efforts in Alaska as too little, too late, noting that "effective leadership was vital to keeping death rates down" (p. 257). Effective leadership in Bristol Bay came from the APA which acted "without portfolio" when confronted with the devastation in Nushagak Bay. The 1922 Service document depicts a funeral boat, "its sails fluttering idly in a listless breeze," coming aground at Naknek. Describing the APA-sponsored succor provided to the children in the boat, the story ends boldly, "this is not fiction." The APA (1922) describes itself as "the only human agency that could have coped" with the local epidemic because it was already on the ground with food, supplies, and medical personnel (p. 5). The APA came prepared for a full season of fishing and was capable of resupplying for the relief effort in mid-season. The company was accustomed both to working with the Natives and to standing up and taking down an entire region's care and employment operations in a matter of days at both ends of the fishing season. It was an operation remarkably militaristic in character, but unhampered by the weak leadership characterizing the governmental organizations involved in 1919. Profit motivation by a private company must obviously be considered, and yet, the 1919 fishing season was notable for being the lowest run in history (reported in the remainder of Warden Baker's report; Baker, 1919). Even so, the APA refused to calculate its relief expenditures when encouraged to do so by the Territorial Governor, who wished to draw "attention to the neglect of the natives by the Government" (APA, 1922, p. 6).

The contradictions between the Coast Guard and the APA reports are startling. The Coast Guard's annual summer mission had long included incidental rescue and medical care, but Congress had allocated an additional $100,000 specifically for the purpose of feeding, supplying, and caring for Native Alaskan residents of Alaskan coastal communities during the pandemic. The Coast Guard reported to Congress that it provided such aid and claimed responsibility for saving innumerable lives, burying the dead, and dispatching starving dogs feasting on human remains in Bristol Bay villages. The report characterized the Coast Guard as tireless and heroic and Congress accepted the report uncritically, praising the Coast Guard for its efforts. However, the Coast Guard report was inaccurate. It was the key governmental agency charged with and funded to mitigate the disaster, but largely failed to respond to the tragic circumstances it encountered.

Haycox's (2006) "American colony" occupied a political status somewhere between a government protectorate and an industrial resource. The 1919 rescue of the Natives in Bristol Bay contrasted governmental and private actions in a place that existed only once in U.S. history. Dereliction seems the best characterization of the federal response; at worst, the Coast Guard betrayed its mission to rescue the Natives with appalling callousness and perfidy. Private efforts remained unknown until years after events: Neither Congress nor history attended to the APA account.

In spite of all efforts, the loss of life in the region was stupefying. At the end of the 1919 fishing season, 238 orphans remained of 800 to 1,000 adult Native Alaskans formerly inhabiting Nushagak Bay (Riggs, 1919; VanStone, 1967). The salvage of the children, however, is well remembered. The Native Health Corporation built at the site of the old hospital, school, and orphanage grew out of the orphaned remnants of the three tribes inhabiting the region (Bristol Bay Area Health Corporation, 2003).

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Author Biography

Maria Gilson deValpine is a public health nurse and professor of nursing at James Madison University in Harrisonburg, Virginia. She earned her PhD in Public Administration & Policy with a minor in Medical Anthropology from Portland State University in 2008. Her research interests include field epidemiology and health disparities.

CURYUNG TRIBAL COUNCIL

RESOLUTION 2020-11

DECLARING A DISASTER AND STATE OF EMERGENCY TO THE GLOBAL COVID-19 PANDEMIC AND NON-ESSENTIAL TRAVEL BAN

WHEREAS, The Curyung Tribal Council (herein the "Curyung Tribe") is a federally-recognized Indian Tribe listed in the Secretary of the Interior's annual list of federally recognized Tribes issued in in accordance with the Federally Recognized Indian Tribes List Act of 1994, Pub. L. No. 103-454, *see* 85 Fed. Reg. 5462, 5466 (Jan. 30, 2020), and

WHEREAS, The Curyung Tribal Council is the federally recognized Tribe for the community of Dillingham, Alaska; and

WHEREAS, Article XII, Section 1 of the Curyung Constitution allows for special meetings at the Call of the (First) Chief and/or at the request of two Council members; and

WHEREAS, In accordance with the Constitution, the Curyung Tribal Council held a Special Emergency Meeting on March 24, 2020 to address the global COVID-19 pandemic; and

WHEREAS, On March 11, 2020 a Public Health Disaster Emergency Declaration signed by Alaska's Governor Mike Dunleavy on March 11, 2020; and

WHEREAS, On March 13, 2020 President Donald Trump declared a National Emergency; and

WHEREAS, The Curyung Tribe strongly recommends residents of Dillingham to hunker-down in their homes, sheltering-in-place during this pandemic by staying at home as much as possible, except to work in certain critical jobs; to buy, sell, or deliver groceries or other important goods; to receive or provide health care; and to get fresh air without contacting others. On the limited occasions when individuals leave home, they should maintain social distancing of at least six feet from any person outside their household whenever possible. Individuals are also encouraged to practice recommended hygiene, including regular hand washing and disinfecting their homes; and

WHEREAS, The CDC has recommended that all persons at higher risk of COVID-19 avoid all nonessential air travel, and the U.S. State Department has advised all U.S. Citizens to avoid all international travel; and

WHEREAS, On March 23, 2020 Governor Mike Dunleavy issued Health Mandate 10.1 effective 12:01am on March 25, 2020 which restricts non-essential air travel into and out of the state of Alaska and requires all people arriving in Alaska from other states or countries to immediately self-quarantine for 14 days and monitor for illness. The failure to follow this order is punishable by a fine of up to $25,000, or imprisonment of not more than one year, or both pursuant to Alaska Statute 12.55.035 and Alaska Statute 12.55.135; and

WHEREAS, the Curyung Tribe strongly recommends anyone returning to Dillingham from the greater Alaska area, outside of Alaska and outside of the United States to self-quarantine in their homes for a period no less than 14 days; and

WHEREAS, Numerous doctors in Alaska have called on the Governor to ban all non-essential travel in the state; and

WHEREAS, Due to the ongoing spread of COVID-19 within the Alaska, the Curyung Tribal Council is increasingly concerned for the health and wellbeing of our members, tribal community of Dillingham and the Bristol Bay region; and

WHEREAS, Rural Alaska suffered terribly from the great flu pandemic of 1918-1919, but a few villages successfully avoided infection by imposing rigid quarantines and preventing outsiders from entering; and

WHEREAS, The Curyung Tribe recommends only essential services and emergency medical services will be allowed effective at 12:01am on March 26, 2020 and all non-essential travel into and out of the community of Dillingham will cease by 12:01am on March 26, 2020; This applies to travel from other villages as well as from regional centers and Anchorage, and to all forms of transportation including air travel, snow machine, and other ground and water transportation.

Essential services. Persons engaged in essential services are:

- Health professionals and other emergency responders dispatched by the state or federal governments, and patients seeking medical treatment.
- Law enforcement personnel from the state or federal government.
- Pilots and other air carrier personnel delivering freight and mail, or transporting passengers engaged in essential services.

Exceptions. The emergency disaster declaration on travel does not apply to:

- Residents of the Village or surrounding villages who temporarily left the Village prior to the enactment of this declaration provided they return home within three (3) days of enactment of this declaration.
- Residents of the Village or surrounding villages who are outside the village for medical care for themselves or a close relative or who leave the Village for medical emergencies may return to the Village when their treatment is concluded, provided that they have certification from a doctor that they have been tested and are not infected with COVID-19.

WHEREAS, The Curyung Tribe recommends that non-essential air travel not resume until May 1, 2020 or until a time that it is determined safe for Dillingham residents; and

WHEREAS, The Curyung Tribe will continue to work with the City of Dillingham, State, Federal and Tribal partners to respond to the COVID-19 pandemic.

NOW THEREFORE BE IT RESOLVED, that due to the global pandemic of COVID-19, the Curyung Tribal Council hereby declares a State of Emergency and Disaster for our tribal community of Dillingham, Alaska; and

BE IT FURTHER RESOLVED that the Curyung Tribal Council urges the City of Dillingham to adopt an emergency ordinance ceasing non-essential travel into and out of Dillingham effective 12:01am March 26, 2020 through May 1, 2020 and requiring anyone traveling into the community within this timeframe to self-quarantine for a period no less than 14 days.

CERTIFICATION:
This resolution was duly considered and adopted at a meeting of the Curyung Tribal Council in Dillingham, Alaska on this 24th day of March, 2020, at which a quorum of Council members were in attendance via teleconference.

ATTEST:

Thomas Tilden, First Chief
Curyung Tribal Council

03.24.2020
Date

Attest:

Tribal Chief

03.24.2020
Date

Return to Excerpt

From:	Wesley Furlong
To:	POA Special Projects; Vice President Alexi
Cc:	Bob Loeffler; Brooke Merrell; Catherine Yeargan; Curyung Tribal Council; Daugherty, Linda (PHMSA); David Fish BSEE; David Seris (David.M.Seris@uscg.mil); Douglass Cooper; H. Sharon Kim; Hassell, David (PHMSA); J. Loichinger; Joan Kluwe; John Eddins; Kyle Monkelien - BSEE; Mark Fesmire; "mary_colligan@fws.gov"; McCafferty, Katherine A CIV USARMY CEPOA (USA); McCall, John; "Mcgrath.patricia@epa.gov"; Molly Vaughan; Moselle, Kyle W (DNR); Nathan Hill; Robert Guisinger; Bill Craig; Bellion, Tara; Matthew Newman; Megan Condon
Subject:	[Non-DoD Source] Nondalton Tribal Council Comments on PFEIS__03.23.2020
Date:	Monday, March 23, 2020 10:25:41 PM
Attachments:	Summary Memorandum.pdf Technical Memorandum 1_Alternatives Analysis.pdf Technical Memorandum 2_Cultural Considerations.pdf Technical Memorandum 3A_Cumulative Impacts.pdf Technical Memorandum 3B_Key Issues.pdf Technical Memorandum 4_Catastrophic Failures.pdf Technical Memorandum 5_Purpose and Need.pdf Technical Memorandum 6_Reclamation and Closure Plan.pdf Technical Memorandum 7-Watershed Health.pdf Compensatory Mitigation Plan Review.pdf Preliminary Final PEbble EIS Review.pdf
Importance:	High

Shane,

Attached please find the Nondalton Tribal Council's comments on the Preliminary Draft EIS, that have been prepared on their behalf by Ridolfi Environmental and Midgard Environmental Services LLC. There are eleven (11) documents attached to this email that comprise the Tribes' comments:

- Summary Memorandum (Mar. 18, 2020)
- Technical Memorandum 1 – Alternatives Analysis (Mar. 18, 2020)
- Technical Memorandum 2 – Cultural Considerations (Mar. 18, 2020)
- Technical Memorandum 3A – Cumulative Impacts (Mar. 18, 2020)
- Technical Memorandum 3B – Key Issues (Mar. 16, 2020)
- Technical Memorandum 4 – Catastrophic Failures (Mar. 20, 2020)
- Technical Memorandum 5 – Purpose and Need (Mar. 16, 2020)
- Technical Memorandum 6 – Reclamation and Closure Plan (Mar. 16, 2020)
- Technical Memorandum 7 – Watershed Health (Mar. 18, 2020)
- Compensatory Mitigation Review (Feb. 20, 2020)
- Preliminary Final Pebble EIS Review (Mar. 5, 2020)

Please confirm that you have received the attached eleven (11) documents and are able to open them.

Wesley James Furlong | he/his/him
Staff Attorney
Native American Rights Fund
745 West 4th Avenue, Suite 502
Anchorage, AK 99501
(907) 276-0680 w.
(907) 276-2466 f.
Blockedwww.narf.org

Alaska Bar Association No. 1611108
State Bar of Montana No. 42771409

M E M O R A N D U M

DATE: March 18, 2020

Prepared By: Bruno A. Ridolfi, P.E., Principal Engineer
Chip Smith, M.S., Regulatory Specialist

SUBJECT: **Summary of Technical Review of the Preliminary Final Environmental Impact Statement**

This memorandum summarizes high-level technical comments from the review of the Preliminary Final Environmental Impact Statement (PFEIS) by our technical review team. The PFEIS for the Proposed Pebble Project was released by the U.S. Army Corps of Engineers (USACE) Alaska District to cooperating agencies for review on February 6, 2020. The USACE developed the PFEIS by revising and editing the Draft Environmental Impact Statement (DEIS) dated February 22, 2019. The same technical team reviewed the DEIS on behalf of the Nondalton Tribal Council (NTC) and provided comments to the Native American Rights Fund (NARF) in a series of seven technical memoranda submitted to the USACE on July 1, 2019.

A series of new technical memoranda are attached to this Summary Memorandum and are identified below.

Number	Primary Authors	Subject
1	Bill Beckley Principal Scientist	PFEIS Response to Technical Memorandum No. 1 (July 1, 2019), Incomplete and Inadequate Development and Analysis of Alternatives
2	Monty Rogers, M.A. Archaeologist	PFEIS Response to Technical Memorandum No. 2 (July 1, 2019), Failure to take a "hard look" at cultural, historic, and subsistence resources in the PFEIS for the Proposed Pebble Project
3A	Teresa Michelsen, Ph.D. Principal Scientist	PFEIS Response to Technical Memorandum No. 3 (June 1, 2019), Incomplete and Inadequate Evaluation of Cumulative Impacts Proposed Pebble Project
3B	Teresa Michelsen, Ph.D. Principal Scientist	PFEIS Response to Technical Memorandum No. 3 (June 1, 2019), Technical Review of the Preliminary Final Environmental Impact Statement (PFEIS) for the Proposed Pebble Project

4	Jim Kuipers, P.E. Bruno Ridolfi, P.E. Principal Engineers	PFEIS Response to Technical Memorandum No. 4 (June 1, 2019), Incomplete and Inadequate Evaluation of Potential Catastrophic Failures for Tailings Storage and other Facilities for the Proposed Pebble Project
5	Jim Kuipers, P.E. Bruno Ridolfi, P.E. Principal Engineers	PFEIS Response to Technical Memorandum No. 5 (July 1, 2019), Inaccurate and misleading statements of Purpose and Need in the Pebble DEIS
6	Jim Kuipers, P.E. Bruno Ridolfi, P.E. Principal Engineers	PFEIS Response to Technical Memorandum No. 6 (July 1, 2019), Reclamation and Closure Plan and Preliminary Financial Assurance Cost Estimate for the Proposed Pebble Project
7	Sherrie Duncan Principal Fish Biologist/ Restoration Ecologist	PFEIS Response to Technical Memorandum No. 7 (July 1, 2019), Preliminary Final Environmental Impact Statement: Incomplete and Inadequate Evaluation of Watershed Health and Function and Aquatic and Terrestrial Resources

Key Issues

The PFEIS does not adequately address several key issues that were identified in our comments on the DEIS. Major flaws and deficiencies that remain in the PFEIS are described below under a series of key issues.

Demonstration of Purpose and Need

The need for the proposed project has not been demonstrated. For the USACE to grant a permit for the proposed project to be permitted, the USACE must demonstrate that the proposed project: (1) complies with the Clean Water Act (CWA) including Section 404(b)(1) Guidelines and applicable regulations; and (2) is "not contrary to the public interest." The Proposed Pebble Project is contrary to the public interest, in large part because the proposed project would cause significant adverse effects with respect to all 21 Public Interest Review Factors, and if implemented, the proposed project would result in significant degradation to Waters of the United States (WOTUS).

The Applicant has not demonstrated a public need for the proposed project. The minerals proposed to be mined are not in short supply globally, and demand is declining for some. The minerals are not particularly strategic or in short supply nationally.

The Purpose and Need Statement was inappropriately modified by USACE. The purpose of this project was clearly stated by the Applicant based on their desire to mine the Pebble deposit. However, the PFEIS states:

> *The USACE has determined that the Applicant's stated purpose is made too narrow by limiting the proposed development to the Pebble deposit. The public's interest in commodities such as copper, gold, and molybdenum does not dictate a particular source of these commodities and the public has also expressed an interest in protecting the state's natural resources, such as fisheries.*

We agree with the statement; however, the USACE then modified the project purpose as follows:

> *. . . to develop and operate a copper, gold, and molybdenum mine in Alaska in order to meet current and future demand.*

It has not been demonstrated that a global, national, or local demand exists for these minerals that cannot be met by existing and proposed projects already under development or in operation elsewhere. An analysis of the supply and demand for these metals has not been provided, nor is there any evidence that a supply emergency exists that would justify the significant, permanent, and unmitigable impacts to the ecological and cultural landscape of the Bristol Bay Watershed. A specific demand for these minerals within the State of Alaska clearly does not exist, since the industries that use copper, gold, and molybdenum are not located in in Alaska. (See Technical Memorandum No. 3 for detailed comments.)

Furthermore, by making this modification to the project purpose statement, the USACE incorrectly and inappropriately narrowed the regulatory scope of analysis for the Department of the Army permit evaluation process, and also for associated evaluations and impact assessments under other federal laws (CWA, Clean Air Act (CAA), Magnuson-Steves Fishery Conservation and Management Act (MSA), Endangered Species Act (ESA), National Historic Preservation Act (NHPA), National Environmental Policy Act (NEPA), etc.). From the perspectives of NEPA and the 404(b)(1) Guidelines, the USACE review and evaluation of the proposed Pebble Project have been fatally flawed from the start.

Technical Memorandum No. 5 (July 1, 2019) identified the need to consider other sources and means of satisfying mineral demands other than the Proposed Pebble Project. The Response in the PFEIS addresses reuse and recycling as alternative sources, and Appendix B of the PFEIS has been updated to include reuse and recycling. However, the Response and changes to Appendix B do not specifically address "other in-ground resources." Instead, the PFEIS responds with this citation: "*In accordance with 33 CFR Part 325 Appendix B, the USACE has defined the purpose and need from both the Applicant's and the public's perspective*." Therefore, the PFEIS is not responsive,

as it does not specifically address why other in-ground resources, specifically mines in other locations, were not considered as alternatives to the proposed Pebble Project in the PFEIS.

Technical Memorandum No. 5 (July 1, 2019) identified the need to expand the Decisions to be Made section of the DEIS to describe all non-federal regulatory decisions and suggested that the DEIS needed to show how the USACE could ensure those decisions could be relied upon. No changes to the DEIS were made in the PFES to incorporate these comments. Instead, the PFEIS responds that the federal agencies and authorities are adequately described, State of Alaska permit decisions are identified, and a complete list of authorizations and permits that may apply to the project are listed in Appendix E. The laws, Executive Orders, and requirements included in Appendix E are listed below:

- NEPA (1969)
- CWA (1972)
- CAA (1970)
- ESA (1973)
- NHPA (1966)
- MSA (1996)
- Rivers and Harbors Act (RHA) (1899)
- Alaska Native Claims Settlement Act (1971)
- Pipeline Safety, Regulatory Certainty, and Job Creation Act (2011)
- Alaska Historic Preservation Act (1971)
- Native American Graves Protection and Repatriation Act
- American Indian Religious Freedom Act (1978)
- Marine Mammal Protection Act (1972)
- Migratory Bird Treaty Act (MBTA) of 1918
- Bald and Golden Eagle Protection Act (1940, 1962)
- Fish and Wildlife Coordination Act (1980)
- National Wildlife Refuge System Administration Act (1966)
- Resource Conservation and Recovery Act (1976)
- Toxic Substances Control Act (1976)
- Executive Memorandum of April 29, 1994 on Government-to-Government Relations with Native American Tribal Governments and Executive Order 13175—Consultation and Coordination with Indian Tribal Governments
- Executive Order 11514—Protection and Enhancement of Environmental Quality
- Executive Order 11988—Floodplain Management
- Executive Order 11990–Protection of Wetlands
- Executive Order 12898—Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- Executive Order 12962—Recreational Fisheries
- Executive Order 13007—Indian Sacred Sites
- Executive Order 13045—Protection of Children from Environmental Health Risks and Safety Risks
- Executive Order 13751—Safeguarding the Nation from the Impacts of Invasive Species

- Federal Mine Safety and Health Act (1977)
- Emergency Planning and Community Right-to-Know Act (1986)
- Safe Drinking Water Act (1974)
- Oil Pollution Act (1990)
- Ports and Waterways Safety Act (1972)
- Outer Continental Shelf Lands Act (1953)
- National Invasive Species Act (1996)
- Executive Order 13186—Responsibilities of Federal Agencies to Protect Migratory Birds

The PFEIS also includes the following statement:

> *The ROD would document the three federal agencies' determinations of whether the project would comply with applicable regulations. Federal agencies make decisions based on the assumption that the permittee will comply with all permit conditions and are empowered with enforcement tools to address non-compliance.*

This response incorrectly implies that federal agencies can enforce ALL permit conditions, including non-federal and non-state conditions. Absent completion (or at least 90-percent completion) of these permitting processes, the USACE is trying to fulfill its regulatory and environmental compliance requirements knowing that a significant portion of the information and approvals required are missing. The USACE cannot say with any confidence that it knows what the actual project is, what the baseline conditions are, what the impacts are, and whether they can reliably determine what their jurisdiction is under the RHA and CWA. Worse, the USACE has no idea what non-federal conditions will ultimately be imposed on the proposed project, so USACE cannot, at this time, simply assume that the applicant will comply with all the conditions and requirements. Applicants often dispute conditions, conditions are renegotiated, conditions are modified, and sometimes applicants withdraw their applications because they cannot implement federal and non-federal conditions. The PFEIS document must discuss this matter.

Technical Memorandum No. 5 (Juy 1, 2019) commented that the DEIS should identify whether there are independent public review processes and opportunities for comment associated with the U.S. Coast Guard (USCG) and Bureau of Safety and Environmental Enforcement (BSEE)

decisions. These processes and their relationship to the federal permitting process should also be described." The Response in the PFEIS is based on the following position:

> *Permit decisions by federal, state, and local governments are usually made independent of each other. In general, permit decisions are not dependent on another permit to be issued. One exception is that the USACE may not issue a permit under Section 404 of the Clean Water Act if the State of Alaska denies a water quality certification for the project.*

This stated lack of dependency among critical permits (including permits related to Tailing Storage Facility safety, reclamation and closure, and financial assurance) other than those described in the PFEIS Response and other permits that the USACE seems to be relying on in the PFEIS, is a potential fatal flaw in the overall permitting process. This approach inevitably leads to actual impacts that have been underestimated in the PFEIS. This lack of dependency should be given a hard look with respect to whether it is the root cause of the NEPA process inherently underestimating potential adverse impacts from mining projects.

Longstanding practice, both nationally and for the USACE Alaska District, is to closely coordinate with states so that federal and state decisions can be based upon a shared understanding of what the project is, what the baseline and impacts are, and how to effectively and efficiently move through all applicable regulatory processes. It is almost unheard of for a project of the size and scope of the proposed Pebble Project to be processed by the USACE without the State processes being underway, either before or concurrently with the NEPA process. As a result, the USACE is proposing to make their final permit decision with no more than half of the information they need to comply with their own regulations.

Technical Memorandum No. 5 (July 1, 2019) commented that Bristol Bay has globally important fisheries. Approximately 42 percent of the world's harvest of wild salmon and 80 percent of the production of high-value wild salmon species such as Chinook (King), sockeye, and coho (silver) salmon, come from Alaska waters. All five species of Pacific salmon return to Bristol Bay to spawn in its rivers, including Chinook, sockeye, coho, pink, and chum. The waters of the region have long been an integral part of the state and local economies, providing thousands of sustainable jobs to Alaskans for generations. Commercial fishing-related jobs account for nearly 75 percent of local employment. The Statement of Concern appears to recognize these facts as well as the importance of protecting WOTUS. However, no changes were made in the PFEIS to incorporate this comment. Instead, the following statement is included:

> *The USACE defines the overall purpose and need while generally focusing on the Applicant's statement and defining the purpose and need for the project from both the Applicant's and the public's perspective. The EIS evaluates alternatives that would meet the overall purpose, and the environmental consequences of each of those alternatives, including impacts to fisheries, subsistence, wetlands, and other waters.*

This response is not acceptable in that it does not consider the public's perspective that preserving fisheries and water quality are of equal or greater purpose and need than the production of metals that would be shipped overseas for processing and use. (See Memorandum No. 5 (March 2020) for detailed comments.)

Because the USACE has chosen to publish a DEIS and a PFEIS based primarily on preliminary engineering and conceptual levels of design for a number of key features (*i.e.*, tailings dams and water management ponds), the USACE has no basis for comparing project benefits/impacts to the benefits/impacts of the No Action Alternative. The administrative record is insufficient and inadequate for making a final permit decision; however, based upon the information that is available thus far, it is clear that the Pebble Project cannot be authorized because of the substantial, unacceptable, and significant degradation it would cause to WOTUS, Bristol Bay ecosystems, tribes, and fish and wildlife species.

Technical Memorandum No. 5 (July 1, 2019) commented that the Pebble Project is highly speculative and provided a financial evaluation (Attachment 5A, May 1, 2019) in support of the comments. The Statement of Concern responds to this comment as well as comments provided by others related to the economic benefits of mining versus the economic benefits of fisheries and other public benefits. The Response in the PFEIS includes the following notable excerpts:

> *However, the USACE is not required to incorporate public interest factors in the purpose and need. In addition, the USACE is neither an opponent nor a proponent of any project, therefore the agency's purpose should not be a part of the purpose and need.*

> *In accordance with 33 CFR Part 320.4, as part of the public interest determination, which is documented in the ROD, the USACE will make a determination regarding the need for the project from the perspective of the public interest, including an evaluation of the economic benefits and detriments of the activities under USACE authority.*

This response basically attempts to justify the approach taken in the DEIS.

Technical Memorandum No. 5 (July 1, 2019) commented that information provided in the DEIS demonstrates neither a need for the project in Alaska nor a need in the United States. The DEIS should have noted that the primary commodities to be produced by the project (copper, gold, and molybdenum) are not considered by the United States to be "critical minerals." The PFEIS responds by saying:

> *The Applicant is solely responsible for establishing the need for a project* and *the USACE will exercise independent judgement in defining the purpose and need for the project from both the Applicant's and the public's perspective* and *as part of the public interest determination, which is documented in the ROD, the USACE may make a determination regarding the need for the project from the perspective of the public interest.*

This implies that tribes, cooperating agencies, and the public will need to wait until the Record of Decision (ROD) to see how the USACE addresses this concern, the purpose and need of the proposed project, and other aspects that USACE considers to be "from the perspective of public interest." The USACE's position on this matter does not reconcile with the continuous participation of the NTC and other cooperating agencies in the NEPA process that is based on ensuring that their perspective of public interest was addressed in the NEPA process.

Technical Memorandum No. 5 (July 1, 2019) commented that the significant issues based on public, tribal, and agency comments made during the scoping process should be summarized in the DEIS. The summary for each issue should describe the measures to be used to assess each of the issues across the alternatives. The subtopic Statement of Concerns in the PFEIS only recognizes our comments generally and suggests that: "*The EIS Chapter 1 should identify the significant issues of the project.*"_No changes to the DEIS were made as a result of these comments. Instead, the PFEIS includes the following statement:

> *Section 4.1.2 lists the issues that were selected for analysis in the EIS. These issues were identified through the scoping process. In addition, the Executive Summary summarizes the issues and analysis identified for inclusion in the EIS.*

This statement is not accurate, because comments and recommendations provided by cooperating agencies during the scoping process were either ignored or minimally incorporated into the Preliminary Draft Environmental Impact Statement (PDEIS), the DEIS, and the PFEIS. The

PFEIS is nonresponsive with respect to important issues that were included in the scoping process but excluded from the PDEIS, the DEIS, and the PFEIS. ([See Technical Memorandum No. 5 (March 2020) for detailed comments.)

Development and Analysis of Alternatives

A reasonable range of alternatives was not evaluated for neither the Applicant's original purpose and need nor the USACE's modified purpose and need. The PFEIS still fails to "rigorously explore and objectively evaluate all reasonable alternatives" as required by the NEPA (40 CFR 1502.14; 33 CFR 325, Appendix B). The PFEIS still includes only a single mine location, a single mine layout, and a single throughput option. The PFEIS should be revised to include other reasonable mine locations, a range of mine layouts, and a range of throughput options, and a Revised Draft Environmental Impact Statement (RDEIS) should be re-issued for review by cooperating agencies and the public. (See Technical Memoranda No. 1 and No. 3 (March 2020) for detailed comments.)

Taking a Hard Look at Cultural, Historic, and Subsistence Resources

As demonstrated in the PFEIS, USACE has failed to take a "hard look" at several important aspects of the cultural heritage of the areas and region that would be affected by the proposed project. The USACE has also failed to take a hard look at potential impacts to cultural, historic, and subsistence resources. This failure has resulted in an inadequate identification and analysis of the resources that make up the cultural heritage of the areas and region that would be affected by the proposed project. To begin to address this failure, the USACE needs to re-evaluate its analysis of the region's cultural heritage throughout the PFEIS. The PFEIS should be revised to include a thorough and complete analysis in accordance with federal regulations of the region's cultural heritage and supported by a hard look at the potential impacts to this cultural heritage.

The required "hard look" can only be accomplished by holding a series of meaningful staff coordination and leadership government-to-government consultations with all of the federally recognized tribes in the Bristol Bay and Cook Inlet regions. The PFEIS should revised after the requisite meeting have been conducted and the resulting information incorporated in a RDEIS. This RDEIS should be re-issued for review by cooperating agencies and the public.

The PFEIS contains the following objectionable statement:

> *Many project features would be removed, reclaimed, or both during closure. Once restoration activities have been completed, impacts on the availability of subsistence resources would be reduced as these areas would revegetate and return to a more natural state*. (page 4.9-6)

It is apparent that USACE has a very different definition of "natural state" than the NTC and other tribes in the region. While Western science may call the reclaimed mine area natural, Dena'ina and Yup'ik ways of knowing will view the reclaimed mine area as forever contaminated and unnatural. USACE needs to rely on more than one knowledge system in their impacts evaluation. This divergence in the meaning of "natural state" is highlighted this statement by USACE:

> *. . . there could still be community concerns regarding the perception of contamination and the safety of subsistence resources in communities downriver from the mine site. Beliefs about subsistence resources being contaminated or unsafe can impact the mental and spiritual health of the community and can interrupt the transmission of traditional knowledge and practices. These impacts would be long term, potentially lasting post-closure, and likely to occur if the project is permitted and constructed*. (page 4.9-12)

First, it is not "*could still be*" concerns. Concerns exist now about downriver contamination. Second, believing your community's food supply is unsafe absolutely will impact, not "can" impact, the mental and spiritual health of the community. Believing the food supply that is central to your community's identity is contaminated will disrupt the passing on of traditional knowledge and practice. Finally, these impacts will not "potentially" last into post closure; these impacts will last through post closure. (See Technical Memorandum No. 2 (March 2020) for detailed comments.)

Lack of Information and Time for Cooperating Agencies and the Public to Review

The proposed project has been continually modified throughout the NEPA process, and several key reports and design documents describing the proposed project have not been available during the Environmental Impact Statement (EIS) review process. A total 40 significant documents responding to requests for information were uploaded to the USACE project website in the week prior to release of the PFEIS. Approximately 145 documents were uploaded after the close of the public comment period on the DEIS, and most of these were uploaded within 60 days of the USACE releasing the PFEIS. The project was clearly evolving during this time frame, even as the public and cooperating agencies were attempting to understand the proposed project and its potential environmental impacts.

These recent changes have resulted in substantial modifications to the proposed project a set of different environmental impacts that would affect different geographic areas than were disclosed to the public in the DEIS. Since our review of the DEIS, over 146,000 pages of new information have been added to the record, much more information than was available at any stage of the review and consultation process, and most of this information was newly released.

Representatives of the NTC, NARF, federal agencies, trade organizations, and the public have commented previously that the PFEIS is critically flawed because it is based upon incomplete information, inadequate analysis, and conceptual designs for key aspects of the proposed mine and infrastructure. Additionally, USACE has not provided cooperating agencies with a reasonable amount of time to adequately review all the requests for information (RFIs) that include a great deal of important, complex, and highly technical information.

A RDEIS should be prepared that accurately describes the project as currently proposed, identifies and thoroughly evaluates the environmental impacts of the proposed project, and describes the proposed mitigation for these impacts with all the supporting information carefully integrated into the RDEIS. Once the cooperating agencies and the public have been provided an opportunity to review a complete RDEIS, a Draft Final Environmental Impact Statement (DFEIS) can be prepared. (See Technical Memorandum No. 3B (March 2020) for detailed comments.)

Data Gaps, Inadequate Information, and Information Not Available

Key data gaps that were identified during review of the PDEIS and the DEIS remain unfilled, and these key data gaps prevent an adequate review and analysis of the potential environmental impacts of the proposed project. (See Technical Memorandum No. 3B (March 2020) for detailed comments.)

Potential Catastrophic Failures of Tailings Storage Facilities and Other Facilities

The Failure Modes and Effects Analysis (FMEA) workshop conducted by USACE for the Proposed Pebble Project provided results that are biased to support a pre-determined decision not to include a full-breach analysis in the DEIS. The results of the Pebble FMEA are also biased in terms of underestimating both probabilities and consequences of all potential failure modes (PFMs).

To inform our comments on the DEIS, we conducted a FMEA workshop. To compel the USACE to take a hard look at potential consequences of catastrophic failures, we recommended that the USACE conduct another FMEA workshop involving representatives of all stakeholders and well-qualified and experienced experts. We explained that such an FMEA workshop would result in a more balanced approach to assessing potential failure modes and determining which failures should be analyzed in a revised DEIS.

The PFEIS is largely non-responsive and our comments contained in Technical Memorandum No. 4 (June 1, 2019), and the recommendation to conduct another FMEA workshop was not accepted. Due to the gravity of the concerns reflected our comments, the issues in question should be

discussed in more detail, given further consideration, and properly addressed prior to releasing a FEIS. (See Technical Memorandum No. 4 (March 2020) for detailed comments.)

Reclamation and Closure Plan and Financial Assurance Cost Estimate

Technical Memorandum No. 6 (July 1, 2019) provided extensive comments regarding the lack of a detailed reclamation and closure plan in the DEIS. Without this information, the DEIS does not provide adequate context for assessment of impacts to wetlands, WOTUS, or other impacts, including to wildlife, fish and aquatic resources, subsistence resources, and other human uses and activities, since it fails to provide specific reclamation and closure information necessary to develop a science-based finding as to post-mining impacts or mitigation. The Response in the PFEIS included the following statement:

> *PLP has provided a reasonably detailed Reclamation and Closure Plan to help inform the impact analysis for the FEIS (PLP 2019-RFI 115). The purpose of PLP's Reclamation and Closure Plan is to provide guidelines for implementing stabilization and reclamation procedures for the various facilities associated with the project. These guidelines are based on the best available reclamation technologies and on state regulations for mine reclamation. PLP's Reclamation and Closure Plan has been summarized in Chapter 2, Alternatives, and incorporated into impact analyses in Chapter 4 of the FEIS where appropriate. An approved reclamation plan is required by the state mining regulations (11 AAC 97.300—97.350), and the reclamation plan does not become effective until a performance bond is in place, except for certain small operations.*

Including a more detailed Reclamation and Closure Plan (RCP) was partially responsive to our comments and filled a critical data gap. Now, a RDEIS that includes the new RCP information should then be provided for review by cooperating agencies and the public prior to preparing the FEIS.

In comments on the DEIS, we identified the need for financial assurance information as follows:

> *The proposed Pebble Project includes measures and controls that would require long-term post-closure operations and maintenance (O&M) to protect water quality. <u>The need for long-term post-closure O&M, facilities replacement, and monitoring should be acknowledged in the DEIS. The DEIS should contain adequate details regarding financial assurance commitments (e.g., for reclamation and long-term O&M) as well as meaningful assurances that a proper financial instrument will be established to</u>*

> *ensure that adequate funds are available as long as they may be needed for this purpose.*

The Response in the PFEIS attempts to justify excluding the financial assurance information by deferring to the State of Alaska and future permitting activities. The PFEIS response includes the following statements:

> *Under these circumstances, where an estimated bonding amount is not available, the NEPA review analyzes effects under the assumption that state permitting requirements are complied with. The ADNR would work with PLP at the appropriate time to ensure PLP submits a complete Reclamation and Closure Plan, including cost estimates, sufficient for review under applicable state statutes and regulations. The estimated financial assurance costs would be subject to a public review period during the state permitting process. This would be the opportunity for the public to comment on the detailed information that would be part of the calculation for funding amounts for long-term post closure costs.*

We take exception to this position, because we provided a reasonably detailed and professionally estimated reclamation bonding amount in our Technical Memorandum No. 6 (July 1, 2019) that is based on the conceptual designs and limited RCP information provided in the DEIS. This information was not provided in the FEIS.

Recently, State officials were quoted as saying that the USACE must not rely on the State to do engineering and design work for them—the State expects that the Applicant and the USACE will provide 100 percent complete designs for State review and comment. Changes may occur, but the State expects final (not preliminary and conceptual) information when the Applicant initiates the State permitting processes. All of this engineering and design work should be done and described in the recommended RDEIS.

The lack of reclamation bond estimate and financial assurance information in the PFEIS is a serious deficiency. We recommend that this information be provided in a RDEIS, and that this document be released to cooperating agencies and the public for review prior to preparing a FEIS. (See Technical Memorandum No. 6 (March 2020) for detailed comments.)

Evaluation of Watershed Health and Function and Aquatic and Terrestrial Resources

Adequate time has not been allotted to do a thorough review as needed to gain a full understanding of the PFEIS and associated supporting documents. Models for groundwater, air

quality, and fugitive dust were recently revised, updated with new data, or completely replaced with new models. Wetlands and vegetation were remapped using supplemental data. Sufficient time was not given for critical review of these models and remapping efforts. Consequently, we recommend that USACE prepare a RDEIS that includes all this new information and release this document to cooperating agencies and the public for review prior to preparing a FEIS.

The scale and scope of the proposed Pebble Project are unprecedented, and if the proposed project is permitted, constructed and operated, it would affect a vast area, most of which are pristine and fully functioning ecosystems. The potential adverse impacts from the proposed project would be extraordinary to the Bristol Bay Region.

Under the 78-year mining plan, which is, we believe, the ultimate objective of the proposed project, nearly 11,000 acres of wetlands will be directly destroyed, and up to 30,000 acres of wetlands will be indirectly affected. Under the 20-year mining plan, an estimated 105 linear miles of streams will be destroyed. Under the 78-year mining plan, this estimate increases to 339 stream miles.

The PFEIS has not been significantly altered from the DEIS, which was neither sufficiently complete to enable a sound permit decision nor sufficiently clear for reviewers to fully understand the proposed project and make informed comments and recommendations. The health and function of a watershed not only affects aquatic and terrestrial resources, it also affects the health of the indigenous population and the function of Native lifeways and cultures through reduction of fish and wildlife populations and bioaccumulation and biomagnification of mercury and other contaminants in fish and wildlife tissues.

The PFEIS does not address the comments on the DEIS submitted by the NTC and NARF to USACE with Technical Memorandum No. 7 (July 1, 2019). The PFEIS continues to parse out, separate, and minimize the ecological issues, and the PFEIS does not recognize that the ecological health and function of the pristine and wild ecosystems of Bristol Bay and Cook Inlet Watersheds are directly related to the survival of Native people, sovereign governments, and communities.

The PFEIS continues to piecemeal the proposed Pebble Project and the evaluation of potential impacts, and it provides no comprehensive analysis of cumulative effects. NEPA prohibits segmenting large projects into smaller pieces for a piecemeal evaluation of potential environmental impacts. The full buildout of the proposed project, including the inevitable expansion of the proposed project and the corresponding operation, reclamation, closure, and

post-closure phases (long-term and in perpetuity) must be analyzed as one project under one NEPA effort.

The proposed project calls for multiple stream crossings in the form of culverts that will remain indefinitely on the landscape; yet, there is no mention in the PFEIS of the long-term and permanent impacts and cumulative effects due to probable lack of maintenance or complete failures over time. It is not clear from the PFEIS if the culverts and bridges would be designed to pass 100-year flows and associated debris and sediment and how the frequency and volume of these flows and associated debris will change due climate change.

If permitted, constructed, and operated, the proposed project would leave a large, permanent footprint on the region with impacts across seven watersheds. This footprint from direct and indirect impacts cannot be reduced to a few miles of a few selected streams where construction will occur. Additionally, simply discharging treated effluent to downstream areas will not enhance those habitats that were once pristine and naturally functioning with unique water quality characteristics that anadromous and resident fish species rely on. Once these unique water quality characteristics are lost, the fish will be adversely impacted or lost completely.

Like the DEIS, the PFEIS process was rushed, and this has resulted in another incomplete document that fails to acknowledge and evaluate several potential impacts and fails to conduct an analysis of the full buildout of the entire mining operation and associated infrastructure.

A major data gap in the PFEIS is that all waters with anadromous or resident fish have not been identified. The PFEIS continues to rely on an old and incomplete data set that includes only a few days of observation in a few places. Fish move widely and far, occupying different habitats within a watershed from year to year. Therefore, looking at a stream very briefly, one time on one day is not enough to determine if that stream is used by fish. Fisheries professionals working in the area typically visit streams and specific study locations a number of times over a 3- to 5-year period to try to capture the variability of stream use by salmon and other fish from a system perspective. It is common knowledge that a stream sample site that seems to have low population numbers one year may have extraordinarily high numbers of fish at a different time of the year, or in different years.

The PFEIS completely ignores existing fisheries science and field practices. As a result, the determination of the fisheries baseline is fatally flawed, as is the analysis of impacts to fisheries. If the fisheries analysis had been done properly, it would be clear to the USACE that the existing pristine conditions must be preserved and that the proposed project cannot be authorized.

Consequently, the PFEIS does not provide a robust analysis or quantification of cumulative impacts, including synergistic effects. The PFEIS is relying on conceptual designs to analyze an intricate, large-scale mining project of unprecedented mine size, extensive infrastructure, and massive tailings dams. The PFEIS neglects to consider the full scope and long-lasting irreversible and potentially catastrophic environmental consequences of a tailings dam failure, long-term releases of contaminated wastes, and imposing infrastructure being on the landscape in perpetuity.

The PFEIS continues to be incomplete with several data gaps and unavailable information that make it impossible to adequately evaluate the environmental impacts of the proposed project to the extent necessary and to apprise and inform decision makers and the public about the full breadth and intensity of these impacts as necessary to identify the Least Environmentally Damaging Practicable Alternative (LEDPA). In this watershed the LEDPA should be the No Action Alternative.

The CWA directs the USACE to issue discharge permits only if: (1) no significant degradation will occur; (2) there is no practicable alternative which would have less adverse impacts; and (3) all appropriate and practicable measures to minimize harm have been included. The PFEIS does not include a reasonable range of alternatives for consideration. The PFEIS includes only two similar alternatives with variations in the transportation corridors, and it includes no considerations of alternative locations or less impactful alternatives.

The proposed project exceeds the criteria set forth in the Environmental Protection Agency's 2014 Bristol Bay Watershed Assessment and proposed determination for unacceptable adverse effects resulting in the complete loss of documented salmon streams, tributaries, and wetlands due to disposal of dredged or fill materials into Waters of the United States to develop the mine pit, construct tailings impoundments, and store waste rock piles. In addition, water withdrawal and capture, water storage, water treatment, and release of wastewater associated with the proposed mine would significantly impair the fish habitat functions of other streams, wetlands, ponds, lakes, and aquatic resources through elimination, dewatering, and fragmentation. These losses would be irreversible and irretrievable.

The PFEIS relies on providing critical system designs, management plans, and monitoring plans, and other information needed to properly evaluate potential impacts in this EIS at a later date during future permitting efforts. Many of these designs and plans are important for understanding the mitigation measures and monitoring efforts intended to protect the environment from the proposed project. The missing or inadequate plans include but are not limited to: Dust Control

Plan; Wildlife Management Plan; Aquatic Resource Monitoring Plan; Cultural Management Plan; Stormwater Management Plan; Erosion Management Plan; and Groundwater Monitoring Plan. This approach leaves the public and decision makers lacking necessary information to truly understand the social and environmental impacts from the proposed project.

The Compensatory Mitigation Plan (CMP) provided with the PFEIS is drastically insufficient. This CMP includes no compensatory mitigation in the areas of impact, since the footprint of the proposed project will remain in perpetuity, and the watershed is so remote, pristine, and lacking areas that need restoration or protection. Instead, the CMP recommends fixing a few culverts in already impacted watersheds, updating existing water treatment plants and picking up debris and garbage on beaches. None of this suggested mitigation would begin to offset the damage to the ecosystem and loss of the functions and services it provides to the aquatic and terrestrial species and humans in the affected area and beyond. Therefore, the LEDPA in this case is the No Action Alternative, and the USACE should deny the permit application without prejudice.

There have been several iterations of the Draft or Final CMP that have substantially changed from January 2019 to January 2020 with little to no time afforded to cooperating agencies and the public to review the revised CMP. The proposed compensatory mitigation actions are inadequate and not appropriate for replacing the habitat and ecosystem functions that would be permanently lost as a result of the proposed project. Furthermore, the public and peoples of the Bristol Bay region will not be allowed to review the CMP and provide input on this critical mitigation proposed to offset the extensive irreversible and irretrievable loss of habitat from this proposed project.

The proposed compensatory mitigation actions are severely inadequate to replace the thousands of acres of functioning wetland habitat and hundreds of miles of stream habitat that will be lost as a result of the proposed project. Furthermore, public and community involvement during marine debris cleanup efforts is not appropriate and should not be accepted as Applicant-responsible mitigation. The following points are to summarize the comments above:

- Culvert replacement in mostly other parts of the State by voluntary participants does not restore permanently removed pristine, naturally functioning habitat, function, and services.
- Wastewater facility upgrades do not restore destroyed pristine, naturally functioning habitat, function and services.
- Marine debris (beach garbage) cleanup does not restore lost pristine, naturally functioning habitat, function and services.

The following recommendations were provided during our review of the DEIS and are hereby resubmitted as part of our review of the PFEIS:

- To appropriately evaluate the impacts resulting from destruction of this interconnected ecosystem and complete loss of the biodiverse and functional habitat and services provided to freshwater, estuarine and marine aquatic and terrestrial resources, ecological studies must be conducted at the watershed and landscape level.

- The PFEIS should be completely revised and released to the public for review. This RDEIS should be include and be informed by adequate baseline studies completed to facilitate appropriate evaluation of short-term and long-term direct, indirect and cumulative impacts, including synergistic effects, that will result in irreversible damage and irretrievable commitments of aquatic and terrestrial resources in Bristol Bay and Cook Inlet watersheds.

- The RDEIS should be reissued to cooperating agencies and the public, and an appropriate amount of time should be allowed for the cooperating agencies and the public to review and comment on the RDEIS.

See Technical Memorandum No. 7 (March 2020) for detailed comments.

Consistency with Regulatory Requirements and Practices

The Applicant must seek over 60 approvals and permits from the State of Alaska; however, the Applicant has not yet applied for any of these State permits. Although it is not a legal requirement that the Applicant apply for State permits concurrently or before filing a permit application with USACE, it is common practice nationally and in Alaska. This is a critical issue. First, the Applicant cannot apply for State permits without doing the requisite detailed engineering and design work. Second, State staff have been quoted in the press that this project, like all major projects, is sure to change as it moves through the State processes. Hence, USACE is preparing a NEPA document with only the federal part of the permitting process. This is a process flaw, and it prevents other agencies, tribes, and the public from knowing what the actual scope of the proposed project will be and what the potential impacts are. Why USACE continues to press forward without State input is beyond comprehension.

Regulations at 33 CFR 325.3(a) state that when a project is so speculative that alternatives and avoidance and minimization cannot be meaningfully addressed, the permit application, NEPA documents, and related environmental compliance information can be considered incomplete. For the proposed Pebble Project, we expect the USACE District Commander to make this

determination and require the Applicant to go back to the drawing board, complete engineering and design work for all mine facilities and infrastructure, update and complete baseline environmental studies, complete the effects analysis, and coordinate with the State of Alaska, so that a complete and accurate RDEIS can be prepared. If this is not done, the USACE will make its decision based on an incomplete and inadequate EIS.

An EIS that fails to provide the public with meaningful opportunities to review and understand the federal agency's proposal at key points in its evaluation and decision-making process, methodology used, and how potential environmental impacts were analyzed violates NEPA, and legal precedence supports this statement.

Conclusion

The Applicant is proposing a project that, if permitted and constructed, will impose an extensive and intense adverse impact on a natural and fully functioning ecosystem and a wealth of natural resources of the Bristol Bay region. The subsequent operation of the proposed project will pose severe and intense adverse impacts within all the areas affected by the proposed project, and since many of these impacts will persist in perpetuity, the entire watersheds will be adversely affected.

The Applicant is essentially asking for permission to take the affected watersheds, the associated ecosystems, natural resources, cultural resources, and peoples' lifeways out of service in exchange for an unjustified large-scale metal mining and milling operation. The sacrifice the Applicant is asking the Alaska Native people, residents of the Bristol Bay region, and the public to accept is not in the community's or public's best interest. The USACE should select the No Action Alternative and should not approve a permit for the proposed Pebble project.

M E M O R A N D U M

DATE: March 18, 2020

Prepared By: Bill Beckley, Principal Environmental Scientist

SUBJECT: **PFEIS Response to Technical Memorandum No. 1 (July 1, 2019) Incomplete and Inadequate Development and Analysis of Alternatives**

In July 2019, the Native American Rights Fund (NARF) and RIDOLFI Inc. (Ridolfi) submitted a series of technical memoranda on behalf of the Nondalton Tribal Council providing comments on the Draft Environmental Impact Statement (DEIS) for the proposed Pebble Project. Technical Memorandum No. 1, entitled "Incomplete and Inadequate Development and Analysis of Alternatives", highlighted the failure of the DEIS to adequately consider and fully evaluate a range of reasonable alternatives to the proposed action. While the memorandum included comments that were addressed in detail in other technical memoranda, Technical Memorandum No. 1 established that the DEIS failed to "rigorously explore and objectively evaluate all reasonable alternatives" as required by the National Environmental Policy Act (NEPA) (40 CFR 1502.14) and the USACE's regulations (33 CFR 325, Appendix B (NEPA), paragraph 9.b.5).

In response to comments raised during the public comment period for the DEIS, the Pebble Project Preliminary Final Environmental Impact Statement (PFEIS) includes a Comment Analysis Report (Appendix D) that summarizes "Statements of Concern" and provides responses in Table D-1 of the Appendix ("Statements of Concern and Responses"). In response to the Statement of Concern that "the DEIS did not analyze a reasonable range of alternatives" the PFEIS states:

> *As required by NEPA implementing regulations and CEQ guidance, the EIS evaluates a range of reasonable alternatives to the proposed action. As described in Chapter 2, Alternatives, of the EIS, over 100 project options were evaluated during the alternatives development process, including alternatives for mine location and layout, mining methods, processing, throughput, gold recovery methods, power, access, concentrate transport, reclamation and closure access, tailings management, PAG waste rock storage, and water treatment. Of these, many options were eliminated from further consideration in the EIS because they did not meet the overall project purpose, were assessed as not reasonable, not practicable, or would not result in less environmental impact compared to the proposed alternative. Appendix B of*

> *the EIS provides a detailed explanation of the screening criteria applied, and an explanation for why each of the many project options that were evaluated were either included as a component of one of the alternatives evaluated in detail, or eliminated from detailed analysis in the EIS. New alternatives suggested during the public comment period for the DEIS have been added to and evaluated in the FEIS Appendix B.*

Although the DEIS (and the PFEIS) provided an appendix (Appendix B) that includes a description of alternative components that were eliminated from detailed analysis, and the reasons for their having been eliminated, the PFEIS still fails to "rigorously explore and objectively evaluate all reasonable alternatives."

This is especially true for the required No Action Alternative, which must be evaluated objectively and at the same level of detail as action alternatives. Having a comprehensive, objective, and robust evaluation of the No Action Alternative is critical information for decision makers to have when making final permit decisions.

Agencies are obligated to evaluate all reasonable alternatives or a range of reasonable alternatives in enough detail so that a reader can compare and contrast the environmental effects of the various alternatives (A Citizen's Guide to the NEPA; CEQ, 2007). However, the PFEIS still includes only a single mine location, a single mine layout, and a single throughput option. While certain alternative components, including access and transportation options, differ among the alternatives, they are essentially variations on a single alternative, and not truly different alternatives.

Appendix D of the PFEIS includes a statement of concern that the overall project purpose and need is too narrowly focused, and limits consideration of alternatives to the Applicant's preferred site. The response notes that "*the purpose and need must not be unreasonably narrow so as to preclude consideration of a reasonable range of alternatives*" (Appendix D, Page D-164), and in response "*the purpose and need was expanded from the Applicant's proposed purpose and need.*" While the PFEIS states that "*the USACE has determined that the Applicant's stated purpose is made too narrow by limiting the proposed development to the Pebble deposit*", development of the Pebble deposit is the only alternative considered. In fact, as noted above, the PFEIS only fully evaluates one mine location, one mine layout, and one throughput option—all other mine locations, layouts, and throughput options were eliminated from detailed analysis.

The PFEIS fails to "rigorously explore and objectively evaluate all reasonable alternatives" as required by NEPA. The EIS should be revised to include other reasonable mine locations, a range of mine layouts, and a range of throughput options, and should be re-issued as a Revised Draft EIS for public review.

M E M O R A N D U M

DATE: March 18, 2020

Prepared By: Monty Rogers, M.A., Archaeologist

SUBJECT: **PFEIS Response to Technical Memorandum No. 2 (July 1, 2019) Failure to take a "hard look" at cultural, historic, and subsistence resources in the PFEIS for the Proposed Pebble Project**

EXECUTIVE SUMMARY

In the 1971 decision *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402 (1971), the Supreme Court made clear that courts reviewing agency actions affecting environmental values must be aggressive overseers.[1] Consequently, in this Preliminary Final Environmental Impact Statement (PFEIS), the U.S. Army Corps of Engineers (USACE) is well advised to take a "hard look" at the potential impacts of the proposed project and identify feasible and prudent alternatives that would avoid or minimize adverse impacts to the environment and losses of the valuable cultural heritage of the region that the proposed project places in serious jeopardy.

USACE continues its failure to take a "hard look" at several aspects of the cultural heritage in and around the proposed Pebble Project. USACE's failure to take a "hard look" has resulted in an inadequate analysis of cultural, historic, and subsistence resources that make up the cultural heritage of the proposed project area required by Section 106 of the National Historic Preservation Act (NHPA). The result will be the destruction and/or degradation of historic properties, cultural resources, and sacred sites and places. This technical review addresses the USACE's failures in taking a "hard look" at the region's cultural heritage and the impacts to it in their Pebble Project Draft Environmental Impact Statement (DEIS).

Recommended Actions

The USACE needs to re-evaluate its analysis of the region's cultural heritage in Sections 3.7, 3.8, 3.9, 4.7, 4.8, 4.9, 4.27, and in Chapter 5 of the PFEIS. The following are actions the USACE needs to

[1] Rogers, William H., Jr. 1994. Environmental Law, Second Edition.

address as part of its re-evaluation of Sections 3.7, 3.8, 3.9, 4.7, 4.8, 4.9, and 4.27, and Chapter 5 of the PFEIS:

Action Identified Needing to be Addressed in the DEIS	Action Addressed in PFEIS
Properly consult with the tribes potentially impacted by the proposed project.	**No**
Change passive sentences to active sentences to increase readability.	Yes
Increase the Environmental Impact Statement (EIS) Analysis Areas for cultural, historic, and subsistence resources.	**No**
Clarify how the agency is coordinating and complying with other cultural resource laws.	**No**
Expand data gap analyses to include research beyond research information generated by the Pebble Project.	**USACE response to comment is worse than original concern**
Expand the cultural context for Section 3.7.	**No**
Use the extent of locations with Indigenous place names instead of relying on where map makers place the labeling point in their analysis.	Yes
Describe and assess impacts to traditional use areas in Sections 3.7, 4.7, 3.9, and 4.9.	**No**
Examine how aspects of the cultural heritage of the region interconnect through archaeological districts, travel corridors (i.e., locations where multiple trails follow a similar route), and cultural landscapes in relation to the environments in which they exist instead of itemizing cultural heritage.	**No**
Consider all the cultural resources at Diamond Point.	**No**
The USACE needs to have someone in their Alaska Regulatory Division that meets the Secretary of Interior Standards to oversee the Section 106 process for the proposed Pebble Project as required by the NHPA.	**No**
Clarify whether the USACE developed the Area of Potential Effects (APE) in consultation with the State Historic Preservation Officer (SHPO) as is required by 36 CFR 800.4(a)(1).	**No**
Clarify the types of cultural resources that the cultural resource modeling is actually modeling.	Yes
Consider traditional use areas, identified in Section 3.9 and referred to in Section 3.7 as cultural resources, in the agency's Section 106 process.	**No**
The PFEIS should consider impacts from the Pebble Project's ongoing exploration program in their cultural, historic, and subsistence resources analyses.	**No**

Action Identified Needing to be Addressed in the DEIS	Action Addressed in PFEIS
The PFEIS should analyze traditional use areas, documented as part of subsistence research, in Section 3.7 under the cultural resource impact criteria.	**No**
Define "traditional use areas" in Sections 3.7 and 3.9.	**No**
Base the subsistence analysis on current data instead of historical data.	**No**
Examine salmon and water as cultural resources.	**No**
Broaden direct impacts in Sections 4.7 and 4.9 to include sensory impacts.	**No**
Define, describe, and provide counts of traditional use areas in the Alternatives Analyses for Sections 3.7, 3.9, 4.7, and 4.9.	**No**
The PFEIS should explain how impacts lasting years qualify as short-term impacts in Sections 4.7 and 4.9.	**No**
In Sections 3.9 and 4.9, analyze information on exchange of goods and services and identify social networks to monitor changes in the demographics, income, and subsistence of communities.	**No**
Clarify what "historical integrity" means.	**No**
Consider archaeological sites as valued locations of teaching future generations about the past, connecting with ancestors, and manifestations of past subsistence activities and not just valuable for their physical archaeological data.	**No**
Adequately consider impacts to cultural heritage from other projects, as part of the required cumulative impacts analysis.	**No**
Develop mitigation beyond digging and documenting archaeological sites.	**No**
Include "values, spirituality, and a sense of community" in the analysis of Section 4.9 and expand this analysis beyond a few meaningless sentences.	**No**
Consider impacts to cultural resources in Section 4.27.	**No**
Propose some meaningful cultural, historic, and subsistence resources mitigation.	**No**
Take a "hard look" at the short and long-term direct, indirect, and cumulative impacts to cultural, historic, and subsistence resources	**No**

TECHNICAL SUMMARY

Introduction

The USACE has inadequately addressed cultural, historic, and subsistence resources in the PFEIS for the proposed Pebble Project. This inadequate analysis is a result of several issues. First and foremost, the USACE continues to itemize the cultural heritage of the region in the PFEIS by relying on an analysis that treats cultural resources as discrete entities, when many of them are interconnected as districts, cultural landscapes, and traditional cultural properties. Second, the

PFEIS Analysis Area is smaller than the analysis areas for Donlin Gold (two miles for linear features) and Alaska Stand Alone Pipeline projects (five miles for locations with Indigenous Place Names), which are recent projects permitted by USACE Alaska District. Nor does USACE consider night lighting and olfactory impacts in the development of the cultural resources Analysis Area. Third, the USACE needs to integrate the cultural resources and subsistence sections because both address the cultural heritage and traditional use of the region. Furthermore, the USACE needs to use current data to broaden their subsistence analysis to include cultural values, spirituality, a sense of community, and social sharing networks, in addition to the quantitative variables on Subsistence in the Affected Environment and Environmental Consequence sections (Sections 3.9 and 4.9). In response to our comments on Section 4.27, USACE included cultural resources in their spill risk discussion, but limited the discussion to impacts on archaeological sites. USACE needs to broaden their spill risk assessment to include all types of cultural resources. Finally, the mitigation measures the USACE is proposing in Chapter 5 fail to avoid, minimize, and mitigate impacts to cultural, historic, and subsistence resources.

Technical Review

This technical review began with reviewing the Preliminary Draft Environmental Impact Statement (PDEIS) and submitting comments, which resulted in the USACE making minimal attempts to address comments by adding a sentence or two to the DEIS in response. This technical review continues now as an assessment of the PFEIS. The bulk of this technical review consists of comments provided below on Sections 3.7, 3.9, 4.7, 4.9, 4.27, and Chapter 5 of the PFEIS.

Comments on the PFEIS

Comments on the Cultural Resources, and Subsistence subsections of Chapters 3 and 4 of the PFEIS were previously submitted. USACE has either not responded to or has inadequately addressed our previous comments; therefore, these previous comments remain applicable to the PFEIS. In addition to these previously submitted comments, our current comments on the PFEIS address several aspects of the cultural and subsistence analyses in the PFEIS along with mitigation measures in Chapter 5 that are deficient. These deficiencies are summarized below:

Section 3.7

The PFEIS Analysis Area remains inadequate and smaller by comparison than the EIS analysis areas for projects recently permitted by USACE (Donlin Gold Project and the Alaska Stand Alone Pipeline Project) and poorly justified (Page 3.7-1). The PFEIS still needs to clarify why linear features for the Pebble Project only have the potential to impact cultural resources up to one mile away while comparable linear features for the Donlin Project have the potential to impact cultural resources up to two miles away. USACE highlights the inadequacy of their analysis area in their own words.

USACE states, "*This geographic area allows for the consideration of potential direct and indirect impacts on cultural resources from the project using viewshed, noise, and dust analyses*" (page 3.7-1). This is contradictory to what USACE states on page 3.11-1, "*The visibility of night lighting may extend beyond what is visible under daylight conditions and is estimated at a maximum of 20 miles for the mine site and 13 miles for the ferry terminals and ports*." USACE needs to explain this contradiction. Furthermore, USACE highlights the arbitrariness and incompleteness of the cultural resources' analysis area when the agency states:

> *Because changes in olfactory attributes are subjective, this aesthetic attribute is not analyzed in detail. It is assumed that localized changes to smells could result from project-related activities that alter the natural smells that exist under current conditions*. (page 4.11-6)

USACE needs to review 40 Code of Federal Regulations (CFR) 1502.22 in the formulation of their analysis area, which concerns incomplete or unavailable data for an EIS and states:

> *When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking*.
>
> *(a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.*

USACE, in their justification of the APE for Section 106 of the NHPA, states:

> *The portions of the APE that are outside of navigable waters of the US include the direct footprint of the project (i.e., the surface area that would be directly disturbed by construction activities) and the area that is in the foreground and of strongest visual contract; the distance where more than 10 weighed decibels above ambient noise would be expected; and areas that would be impacted by fugitive dust.* (page 3.7-8)

USACE's APE justification is lacking because of its reliance on:

a. daytime foreground for visual impacts;

Expert Agency Comments on Pebble Preliminary Final EIS, Page 268 of 369

Return to Excerpt

b. the Western science perspective that anything below 10 weighted decibels above ambient noise is not an impact; and

c. there is no consideration of potential olfactory impacts.

USACE's use of daytime foreground for visual impacts presumes impacts to cultural resources can only occur in the daytime which contradicts what the agency states:

> *Skyglow from the mine site would brighten the night sky, affecting the human eye from fully adapting to the dark; and reduce visibility of stars and other astronomical observations at some distances. The magnitude and extent of the impact would be that areas 8 to 20 miles from the mine site could begin to experience skyglow from artificial lighting (Table 4.11-2). Impacts may not be readily apparent; however, the introduction of this visual intrusion into an otherwise pristine night sky would begin to put the integrity of the night sky at risk.* (page 4.11-8)

Dena'ina and Yupiit have repeatedly commented that noise from the proposed project will impact the wildlife which are central to their ancestral lands in and near the project. Dena'ina and Yupiit know this because of traditional knowledge passed onto them over countless generations. Dena'ina and Yupiit shared this traditional knowledge on impacts with USACE, yet USACE has failed to incorporate this knowledge into their EIS analyses. This results in an incomplete analysis.

USACE needs to:

a. Gather information on night lighting and olfactory impacts to determine whether redrawing the cultural resources analysis area is necessary

b. Incorporate traditional knowledge into their visual and noise impacts discussion

c. Clearly state the agency is relying on incomplete information for the formulation of the cultural resources analysis area because they are not considering night lighting, olfactory impacts, and traditional knowledge in the formulation of the analysis area and identification of impacts.

This is troubling because assessing night lighting or olfactory impacts "*is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant* (40 CFR 1502.22(a))." Likewise, including traditional knowledge into formulation of the analysis area and types of impacts would not have exorbitant costs.

In response to our DEIS comment about including text describing how the agency is coordinating with other cultural resources laws, USACE added 1.5 pages of text (pages 3.7-2-3) specific to the NHPA, but failed to provide additional insight to other cultural resources laws beyond the bulleted list (page 3.7-3) in the PFEIS. USACE only offers the following two opaque sentences as explanation of the bulleted list:

Other federal laws and Executive Orders (EOs) also require the consideration of effects or impacts on cultural resources in coordination with NEPA and the NHPA. The USACE has incorporated consideration of these laws and executive orders in their permit decision-making process. Additionally, the USACE has reviewed how these laws would apply to cultural resources found in the EIS analysis area. (page 3.7-3)

While we appreciate USACE "*incorporate*[ing] *consideration*" and "*review*[ing] *how these* [other] *laws would apply*," the agency needs to explain how they incorporated, considered, and reviewed these other laws so stakeholders and the public can understand the decision-making process. NEPA and its implementing regulations do not direct an agency to prioritize and centralize the cultural resource discussion on the NHPA and National Register of Historic Places (National Register) eligibility over other cultural resource laws. If the law and regulations do direct agencies to prioritize and centralize the discussion on the NHPA and National Register eligibility, USACE should detail where this is found.

In the DEIS, we commented that the data gap analysis (formerly section 3.7.1) was incomplete because it relied almost exclusively on reports created by the applicant's consultants. In the PFEIS, USACE has completely removed the data gap analysis and has chosen to obscure where information is lacking is inconsistent with NEPA's implementing regulations (40 CFR 1502.22) which requires USACE to "*always make clear that such information is lacking*." USACE needs to clearly identify the data gaps in their cultural resources analysis.

Cultural Context (Section 3.7.1) remains inadequate because it forces readers to find other documents to review. Internet service in rural Alaska makes accessing these large documents difficult and cost prohibitive (*e.g.*, exorbitant costs, slow download speeds, sporadic coverage). This poses an unreasonable burden on people in the communities closest to the proposed project area due to limited Internet access. In addition, USACE provides a bulleted list of the reports the public is to reference to understand the "*detailed cultural context and chronology for prehistoric archaeological traditions, ethnographic, historic-era themes, and contemporary cultural practices is presented in a number of documents* (page 3.7-5)." The issue with this is that the reports comprising three of the four bullets are unavailable to the public. This is because the reports referenced

provide locations of cultural resources, which is typically not shared with the public. As we stated in the DEIS, USACE needs provide a cultural context that is reasonably accessible to the public.

The PFEIS is misleading and inaccurate in its assessment of locations with Indigenous Place Names. First, USACE mistakenly states Vak'ent'esi Vena (Frying Pan Lake) is not in the Mine Site project footprint (page 3.7-12). This is inaccurate because the Water Treatment Plant (WTP) Discharge South extends to the shore of Vak'ent'esi Vena and discharges directly into the lake (see Figure ES-2). Next, USACE states "the transportation corridor has not been subject to specific place names research (page 3.7-14)." This statement is misleading because none of the place name research is specific to a project component. Place name research to date is regional, community, study area based. Even a preliminary review of the sources USACE lists demonstrates USACE's attempt to include Locations with Indigenous Place Names in the transportation corridor is half-hearted at best. USACE does not list the Locations with Indigenous Place Names in the preferred alternative transportation corridor, but it seems at a minimum USACE failed to include the following in its analysis:

- Duntsih 'toward the water' (Iliamna Lake lowlands near Petrof Falls) (Evanoff 2010:133; SRB&A 2013: Figure 6)
- Nila Vena 'Islands Lake' / Nanvarpak 'Big Lake' (Iliamna Lake) (Evanoff 2010:133; Igiugig Village Council 2013 Traditional Igiugig Place Names Map)
- Nila Vena Qech' Tustighitun 'Portage Trail to Islands Lake' (Sixmile Portage) (Evanoff 2010:133)
- Ggis Nuqelahitnu Gguya 'Little Celery is There Stream' (stream near Newhalen River one mile south of Bear Creek) (Evanoff 2010:133)
- K'emeq' Ka'a 'Big Spawning Pond' (Eagle Bay) (Evanoff 2010:133)
- K'emeq' Ka'a Hni'a 'Big Spawning Pond Point' (Eagle Bay Island) (Evanoff 2010:133)
- K'emeq' Ka'a Kiyiq' (Evanoff 2010:132)

The PFEIS continues to ignore Indigenous place name clusters (Kari 1998, 2006) in the analysis as was done for the Alaska Stand Alone Pipeline Project SEIS (USACE 2018:3-436). Place name clusters represent groups of geographic features with an "*anchoring*" geographic feature with associated features around it (USACE 2018:3-436)." Examples of place name clusters include, but are not limited, to Qiyhi Qelahi (Groundhog Mountain), Vak'ent'esi Vena (Frying Pan Lake), and Chixtnu (Canyon Creek) (Evanoff 2011). K'emeq' Ka'a, K'emeq' Ka'a Hni'a, K'emeq' Ka'a Kiyiq' is an

example of a place name cluster in the preferred alternative for the transportation corridor. USACE's continued failure to examine place name clusters is a failure to take a "hard look" at the impacts to these cultural resources.

As in DEIS, the PFEIS fails to address the cultural importance of traditional use areas. USACE states "Information on traditional and contemporary subsistence use areas can be found in Section 3.9, Subsistence, and Appendix K3.9. Section 3.9 does not mention "*traditional use*" once and Appendix K3.9 mentions "*traditional use*" only once. Section 3.9 uses the term "traditional" nine times as a descriptor for values, knowledge, place names, and skills, but not a single time as a descriptor for use areas. USACE needs to include traditional use areas in the cultural resources analysis, because the agency has failed to include these cultural resources anywhere else in the PFEIS.

While improved over the DEIS, the PFEIS fails to holistically examine the cultural heritage potentially impacted by the proposed project, instead choosing to itemize cultural heritage with an analysis relying on counts of individual resources. USACE offers a few sentences about the interconnectedness of the resources comprising the cultural heritage of the proposed project area but doesn't analyze the impacts to the interconnectedness. As we commented before, this is not a "hard look" at potential impacts to cultural heritage. A "hard look" requires USACE to examine how aspects of the cultural heritage of the region interconnect through archaeological districts, travel corridors (i.e., locations where multiple trails follow a similar route), and cultural landscapes in relation to their environments in which they exist.

Section 3.7.6.2 Diamond Point fails to consider all cultural resources SRB&A (2012) identified in their baseline research for the Pebble Project. In their report, SRB&A (2012:i) "identified ancestral Dena'ina place names, oral histories documenting camping and harvesting shellfish, and the possibility of a historic gold lode claim in or near the APE" for a meteorological station on Diamond Point. By simply relying on counts of individual cultural resources, the PFEIS analysis fails to account for oral histories indicating Diamond Point has high potential for cultural resources.

USACE is insulting the Nondalton Tribal Council (NTC) and United Tribes of Bristol Bay (UTBB) when the agency states:

> *No designated TCPs or cultural landscapes have been **formally** identified in the mine site area. However, informants have submitted Groundhog Mountain (Qiyhi Qelahi Cultural Landscape) and the Nushagak River Traditional Landscape as potential TCPs for consideration under Section 106 of the NHPA, based on their significance*

> *in local identity and subsistence (PLP 2018-RFI 097b; Cultural Alaska 2019; Boraas 2019).* (emphasis added).

The NTC is a sovereign government and their identification of the Qiyhi Qelahi (Groundhog Mountain) Cultural Landscape is formal identification. UTBB represents fifteen sovereign tribal governments throughout Bristol Bay, so this is also formal identification of the Nushagak River Traditional Cultural Landscape. USACE does question the formality of Pebble Limited Partnership's (PLP) consultants identifying cultural resources yet categorically qualifies sovereign tribal government cultural resource identification efforts as informal. USACE needs to apologize and correct this insult. USACE's statement on formal designation also reveals the agency is under the mistaken assumption that traditional cultural properties (TCP) and cultural landscapes can only exist if a federal agency determines these cultural resources are eligible for the National Register. This is a false assumption. USACE highlights their reliance on this false assumption when they state:

> *The Nondalton Tribal Council and the United Tribes of Bristol Bay have identified the Qiyhi Qelahi Cultural Landscape (Cultural Alaska 2019) and Nushagak River Traditional Cultural Landscape (Boraas 2019) as two potential historic properties*. (page 3.7-11)

The NTC and UTBB identified these two cultural landscapes as cultural resources. Whether a TCP or cultural landscape is eligible for the National Register has no bearing on these things being cultural resources that need to be included in the impact analysis of the EIS. TCP and cultural landscapes exist outside of regulatory frameworks including the National Historic Preservation Act.

USACE needs to include a map of the Cultural Resources Analysis Area.

USACE needs to add cultural landscapes, traditional use areas, locations with Indigenous place names, and interview identified cultural resources to Appendix K3.7. USACE's statement that:

> *For the purposes of this EIS, the analysis for historic properties (including the tables and information presented in Appendix K3.7, Cultural Resources), are based on known cultural resources listed in the AHRS database that are identified as being in the EIS analysis area. This reliance on AHRS data for defining potential historic properties will be addressed through ongoing research and consultation as part of the Section 106 process*. (page 3.7-9)

USACE's faulty logic of relying on the Alaska Heritage Resources Survey (AHRS) database for historic properties identification has nothing to do with the EIS analysis. How are stakeholders and the public supposed to understand impacts when USACE does not identify what is being impacted beyond providing counts of locations with Indigenous place names and interview-identified cultural resources? USACE assumes all cultural resources are equal, which is a false assumption. When USACE does describe individual cultural resources, it focuses on things listed in the AHRS. An example of this unequal treatment and AHRS bias is USACE's discussion of cultural resources for Alternative 2 Transportation Corridor and Natural Gas Pipeline (section 3.7.6.1 page 3.7-20). USACE details 23 AHRS locations over three paragraphs while USACE limits the discussion of 23 locations with Indigenous place names to two sentences. USACE must correct the AHRS preference bias throughout this PFEIS and adequately describe all cultural resources.

USACE's sole reliance on a place name database that PLP's consultant created is problematic. It is disconcerting that USACE states, "*Public input and additional research may yield the identification of additional place names and contribute to better understanding the cultural significance of these places*" (page 3.7-10). USACE needs to re-review comments tribes have submitted as part of the NEPA and Section 106 processes. The Igiugig Village Council (August 5, 2020 letter to USACE about an Amakdedori cultural resources report) and Igiugig Native Corporation (DEIS comments) have informed USACE that Amakdedori is an anglicized version of the Yup'ik word Amaktatuli which means "*the place to carry things over*," which denotes the place's significance as a site for hunting marine subsistence resources. Igiugig Village Council's comments on the Amakdedori report also discuss research by Janet Klein that includes locations with Yup'ik and Alutiiq place names that may be in the port analysis area.

While USACE has occasionally brought in staff from outside Alaska who meet Secretary of Interior Standards, no one in the Alaska Regulatory Division, who is overseeing the Pebble Project Section 106 process, meets the Secretary of Interior Standards. This means the agency continues to violate the NHPA (54 306101(a)(1)(A)-(B)) making the USACE's Section 106 process unlawful. There has been no change in the NHPA since publication of the DEIS, so the NHPA still mandates that "each Federal agency that is responsible for the protection of historic property (including archeological property) pursuant to this division or any other law shall ensure that . . . *all actions taken by employees or contractors of the agency meet professional standards under regulations developed by the Secretary* in consultation with the Council, other affected agencies, and the appropriate professional societies of archeology, architecture, conservation, history, landscape architecture, and planning; [and] . . . *agency personnel or contractors responsible for historic property meet qualification standards established by the Office of Personnel Management in consultation with the Secretary and appropriate professional societies of archeology, architecture, conservation, curation, history, landscape architecture, and planning*." Furthermore, the ACHP's regulations require that

"each Federal agency responsible for the protection of historic resources, including archaeological resources, to ensure that all actions taken by employees and contractors of the agency shall meet the professional standards under regulations developed by the Secretary." 36 CFR 800.2(a)(1). The Secretary of Interior Professional Qualifications Standards can be found at https://www.nps.gov/history/local-law/arch_stnds_9.htm.

It remains unclear if USACE developed the APE in consultation with the SHPO as is required by 36 CFR 800.4(a)(1). The USACE needs to clarify this.

Section 3.9

The PFEIS states:

> *Communities have subsistence use areas that have been harvested on for generations and represent a sophisticated cumulative body of knowledge about where animals in prime condition are likely to be available throughout the year. Subsistence search and harvest areas for some species are relatively constant, such as salmon fishing areas; while use areas for other species, such as moose, caribou, and furbearers, would vary with changes in abundance and distribution.* (Page 3.9-6)

A definable and "relatively constant" subsistence use area harvested for generations representing a cumulative body of knowledge is a cultural resource, yet USACE has removed all mention of these "traditional use areas" from the cultural resources sections. As in the DEIS, neither Section 3.7 nor Section 3.9 of the PFEIS take a "hard look" at the impacts to traditional use areas documented as part of the research for the proposed Pebble Project. The PFEIS needs to analyze traditional use areas, documented as part of subsistence research, in Section 3.7 under the cultural resource impact criteria.

USACE continues to rely on historical and outdated subsistence data in the PFEIS. USACE states:

> *This section* [3.9.3] *summarizes the most recent available comprehensive subsistence harvest surveys for the six communities near Iliamna Lake that would be most likely to be impacted by the project. Most of these surveys were conducted over 10 years ago and each covers a single calendar year; however, they are high-quality studies with consistent methods across all communities and offer a good basis for comparison amongst different communities. Subsistence use areas vary somewhat from year-to-year based on environmental conditions and the availability of resources.* (page 3.9-5)

This is the only hint in this section that USACE is relying on historical subsistence data to analyze impacts to current subsistence practices. Instead of addressing the issue of using historical data in the Subsistence sections (3.9 and 4.9), USACE has relegated this issue to Section 3.1.6 of the Introduction to Affected Environment. USACE states, "*limited data sets for project area communities is acknowledged in the "Affected Environment" section (Chapter 3) and Appendix K (Technical Appendices) as known data gaps (Table 3.1-2, page 3.1-8).*" This statement is disingenuous and incorrect. The term "data gap" does not appear in Sections 3.9 or 4.9 or Appendix K3.9. The term "limited" does not appear in Section 3.9, appears 10 times in Section 4.9, all in reference to limit of impacts and project proponents and the Applicant's name, and appears once in Appendix K3.9 for the availability of recent subsistence data for Ninilchik which the Alaska Department of Fish & Game (ADF&G) last collected in 1998. As USACE notes (page 3.1-8), the NTC and other commenters raised the issue in the DEIS of agency relying on subsistence data older than 10 years, because these data are not current.

Subsistence data that is 10 years old or older are historical according to the Pebble Project Environmental Baseline Document (SRB&A 2011). NEPA's implementing regulations require information of ''high quality'' and professional integrity. (40 CFR 1500.1, 1502.24). In Table 3.1-2: Data Gaps Screening, USACE states the applicant's consultant Stephen R. Braund & Associates (SRB&A) and the ADF&G collected subsistence data from 2004 to 2011. A review of PFEIS Section 3.9 and Appendix K3.9 shows the majority of subsistence data SRB&A and ADF&G collected subsistence data is 15 years old or older (see Figure 1 below). NEPA's implementing regulations obligate USACE to include current subsistence data in the EIS.

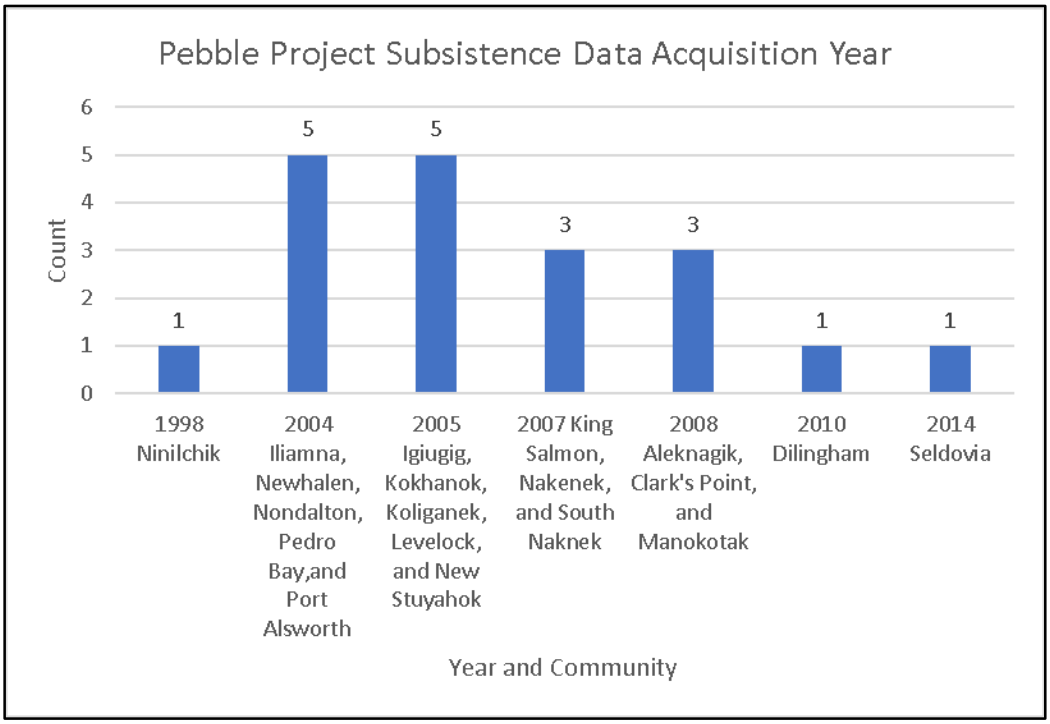

Figure 1: Pebble Project Subsistence Data Acquisition Year

The NCT, as well as other rural and tribal communities in Bristol Bay who live the subsistence way of life in the region do not agree with USACE that "*the available information is adequate for assessing the potential impacts of the proposed action alternatives and variants*" (page 3.1-9).

As we commented in the DEIS, relying on historical data creates an inaccurate picture that doesn't meet EIS methodology and scientific accuracy (40 CFR 1502.24). These regulations state that "Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements." As the U.S Army (2017:27) states regarding EIS methodology and scientific accuracy, "*All analyses must use accepted scientific approaches, using an exact, objective, factual, and systematic or methodological basis. Again, the analysis should be objective, systematic, accurate, precise, and consistent.*" Relying on historical data to identify impacts to current subsistence practices is not "accurate, precise, and consistent" which raises scientific accuracy concerns that USACE must address by using current subsistence data in their analysis in the DEIS. Furthermore, USACE must clearly state that relying on historic subsistence data to understand impacts to current subsistence means the agency is relying on incomplete information (40 CFR 1502.22).

Obtaining current subsistence data is relevant to understanding reasonably foreseeable significant adverse impacts, essential to choosing a reasoned choice among alternatives, the overall costs of

obtaining current subsistence data are not exorbitant, and the means to obtain these data are known (40 CFR 1502.22(a)).

To acquire missing (*i.e.*, current) information, USACE states "*PLP would need to hire a contractor that specializes in subsistence study and the ADF&G would need to allocate funding and staff members for study (page 3.1-9).*" This statement is a departure from how SRB&A and ADF&G collected subsistence data for the Pebble Project previously. Although ADF&G allocated funding and staff for the 1998 Ninilchik and 2014 Seldovia subsistence research, PLP funded SRB&A's research, who in turn funded all of ADF&G's research for the remaining communities (Evans 2013:1; Holen et al. 2011:1; Holen et al. 2012:1; Krieg et al. 2009:6). SRB&A and the National Park Service funded the 2004 Iliamna, Newhalen, Nondalton, Pedro Bay, and Port Alsworth subsistence research (Fall et al. 2006:1). If USACE has information indicating the applicant unwilling to fund efforts to obtain current subsistence data and/or ADF&G will no longer accept external funding, USACE needs to make this clear. Regardless, USACE needs to clarify the statement of whether ADF&G would need to allocate funding.

USACE (Table 3.1-2, page 3.1-9) presumes in their assessment of the need for current subsistence data to understand impacts that:

- Current subsistence data would add little to nothing to the assessment of reasonably foreseeable significant adverse impacts because the agency has accounted for everything;
- 10 to 15-year-old subsistence data is "not atypical" in Alaska; and
- "*Harvest use areas and rates of harvest/sharing . . . follow historical trends, or may be similar enough to adequately address possible impacts.*"

The assumptions USACE are making about the need for current subsistence data to understand and evaluate potential impacts from this atypical project risk the way of life for many in the region. The Nondalton Tribal Council, Igiugig Village Council, and United Tribes of Bristol Bay do not agree with USACE's assumptions and request the agency collect current subsistence data.

As NTC requested in their comments on the PDEIS, DEIS, and now the PFEIS, USACE needs to address the Keystone Recommendations for the Pebble Project that PLP supported (Callaway 2012). These recommendations include the need to collect information on exchange of goods and services and identify social networks to monitor changes in communities' demographics, income, and subsistence. Tables for each community in Section 3.9 have data on Giving and Receiving, but

this is not identifying social networks and offers little else. The Pebble Project chose to ignore Callaway's (2012) recommendations, and USACE is continuing to do so as well. This is unfortunate because failing to adequately examine impacts to social networks dependent on subsistence is failing to take a "hard look" at impacts to subsistence.

Section 4.7

USACE fails to consider the environmental consequences to cultural resources tribes have put forth during the regulatory processes in the EIS analysis area. USACE states:

> *This section provides a discussion of the effects on cultural resources that includes known Alaska Heritage Resources Survey (AHRS) locations, archaeological sites, place names, and interview-identified cultural resources*. (page 4.7-1)

USACE needs to consider Qiyhi Qelahi (Groundhog Mountain) Cultural Landscape and the Nushagak River Traditional Landscape in this EIS analysis. The NTC and UTBB submitted documentation identifying these cultural resources to USACE on August 20 and 28, 2019, which is plenty of time for USACE to address these cultural resources in the EIS analysis.

In Section 4.7.3 Impacts to Cultural Resources, USACE introduces the section with the puzzling statement:

> *Scoping comments expressed concerns regarding impacts to historical and prehistoric sites; cultural resources, traditional use areas and practices; and the confidentiality of information shared on culturally and religiously significant properties.* (page 4.7-5)

USACE needs to clarify what the agency means by "cultural resources" in this statement because all the things listed (i.e., historical and prehistoric sites; traditional use areas and practices, and culturally and religiously significant properties) are cultural resources.

The PFEIS mischaracterizes scoping comments as "*generally expressed concerns regarding impacts to historical and prehistorical sites, and the confidentiality of information shared on culturally and religiously significant properties*." (Page 4.7-2) Commenters repeatedly described the cultural significance of salmon and water during scoping, yet these cultural resources are relegated to biological analyses in their own sections with no analysis of the cultural impacts to these resources.

USACE continues to incorrectly limit direct impacts to physical impacts and indirect to sensory and access impacts (page 4.7-5). Communities and tribes whose cultural heritage is being

impacted should be the ones determining what qualifies as direct and indirect impacts. Sensory impacts can cause just as significant impacts as ground disturbance. Sensory impacts from the initial and primary action of this project will be irreversible and permanent. Sensory impacts will begin immediately with project construction and continue through operation and closure. Sensory impacts will start from the same place as ground disturbance and will radiate out for miles in every direction making them more damaging than ground disturbance in some instances. Sensory impacts are not farther removed or later in time. The same equipment and project components creating the ground disturbance are creating the sensory impacts at the same time in the same place. Furthermore, USACE continues to acknowledge the direct impacts of sensory impacts in stating:

> *The presence of new visual elements, noise, olfactory (odors), and air pollution can impact aspects of a cultural resource from which they derive their significance. These changes result in alterations to the character and setting of a cultural resource. There is potential for permanent visual effects that alter the viewshed to or from a cultural resource with the introduction of mine components (e.g., open pit, tailings and waste rock storage, and water management ponds), buildings, and roads where none currently exist. These impacts are particularly acute where setting and feeling are crucial aspects of a cultural resource's importance. Access restrictions, noise, pollution, lack of privacy, and visual and olfactory intrusions can all negatively impact cultural landscapes, traditional cultural properties, and sites of religious or ceremonial significance, including burial grounds. Access to these areas and the associated cultural practices could be limited or eliminated. Conversely, increased access to the region via construction of access roads could lead to inadvertent or purposeful negative effects on cultural resources, such as looting, vandalism, or trespass in culturally sensitive areas. Collectively, these indirect changes can result in a loss of cultural identity at a landscape level as lifeway patterns and practices are disrupted. Temporary disruptions can still result in permanent impacts on lifeway practices and values*. (pages 4.7-5-6)

Impacts affecting aspects of a cultural resource that make it significant are direct impacts. "*Permanent visual effects*" are direct impacts. Impacts that are "particularly acute" are direct impacts. Despite acknowledging sensory impacts can be acute and permanent, USACE continues to mis-categorize these impacts as indirect despite sensory impacts originating at the same place as ground disturbance in addition to the ability to permanently destroy and damage cultural resources. As we stated about the DEIS, the USACE needs to reevaluate the cultural resource impact criteria with input from the communities whose cultural heritage may be impacted by this proposed project.

USACE states, "*It is likely that many of the interview-identified cultural resources may also be evaluated for National Register eligibility if they are located during field studies*." This statement presumes National Register eligibility requires physical evidence. This is a false assumption. National Register eligibility does not hinge on physical evidence.

As in Section 3.7, the PFEIS continues to use the flawed method of assessing impacts to cultural resources by itemizing them throughout the Alternatives Analyses and fails to take a "hard look" at impacts to cultural resources that constitute districts, cultural landscapes, and place name clusters. This is not a difficult or insurmountable task; as we requested in the DEIS, USACE should revise the PFEIS to achieve an adequate analysis of impacts to the cultural heritage of the proposed project area.

Table 4.7-1 of the PFEIS (Page 4.7-3) inaccurately states there are no place names in the mine footprint. This contradicts USACE's statements in Section 3.7. Refer to our Section 3.7 comments regarding this topic. USACE repeats this mistake in section 4.7.7.1 when they state, "*There are no place names in the project footprint, but five place names are in the* [Mine Site] *analysis area* (page 4.7-8)."

USACE continues to state short-term effects may last "*months to years*" (page 4.7-1). An effect that lasts for years is not short-term even if USACE qualifies short-term as the construction phase. An effect that lasts for years is long-term no matter which project phase in which it occurs.

The PFEIS needs to clarify what "historical integrity" is where it states: "*Indirect effects related to visual, audible, or atmospheric changes (air pollution, olfactory) on archaeological sites are not expected because historical integrity would not be impacted*." (Page 4.7-9) As in the DEIS, the PFEIS arbitrarily assumes that the only value of archaeological sites is their potential for data. Indigenous communities, whose ancestors created these sites, value these places as locations of teaching future generations about the past, connecting with ancestors, and manifestations of past subsistence activities. The PFEIS should be revised to re-evaluate impact criteria and take into account Indigenous communities' views of archaeological sites.

The PFEIS continues to show an archaeological bias in the assessment of impacts from the proposed Pebble Project's drilling program in Section 4.7.11.1. The PFEIS states:

> *Past exploration drilling at the Pebble deposit and other mineral deposits have occurred, including over 1,600 boreholes for the project. The direct cumulative impact of these past and present actions on cultural resources from mining exploration activities are minimal due to limited ground disturbance*. (Page 4.7-15)

USACE also incorrectly states, "*Past exploration drilling at the Pebble deposit and other mineral deposits have occurred, including over 1,600 boreholes for the project, which were surveyed at the time*" (page 4.7-15). As we commented on the DEIS, the PLP archaeological surveys from 2004 to 2013 covered less than half of the locations of the 1,600 boreholes, so to say "direct cumulative" impacts to cultural resources are minimal is an arbitrary guess at best. In a minimal attempt to address impacts beyond those to archaeological data, USACE states: "*cultural resource interviews suggested that local residents reduced their use of Frying Pan Lake for subsistence and cultural activities, which constitute indirect effects on use and cultural context*" (page 4.7-15). Avoidance of a traditional use area and part of the Qiyhi Qelahi (Groundhog Mountain) Cultural Landscape as a result of ongoing Pebble Project activities is not farther removed in time. Avoidance is an immediate and direct impact. Furthermore, this statement does not address the complex issue of impacts to cultural landscapes, traditional use areas, and culturally significant natural resources like water. Van Lanen et al. (2018:119) documents Nondalton residents reporting they avoided the Frying Pan Lake, Groundhog Mountain, and the headwaters of the Upper Talarik and Koktuli creeks, because of the Pebble Project's exploration program.

Avoiding long held, culturally important hunting and trapping areas (i.e., traditional use areas) is a significant, direct impact. It is perplexing how USACE can state the following, but not realize direct impacts are more than ground disturbance:

> *Traditional use of Frying Pan Lake has already decreased due to past exploration activities, mine construction and operations would further impact its use due to restrictions on access, physical displacement of use areas, and degradation of user experience*. (page 4.7-9)

In the very next sentence, USACE acknowledges "*harvest areas*" are cultural resources and then mistakenly states, "*Physical disruption of cultural features on the ground (e.g., camps and harvest areas) is unlikely because none are identified in the footprint*." The Qiyhi Qelahi (Groundhog Mountain) Cultural Landscape encompasses the proposed mine site and this cultural landscape includes "harvest areas."

The USACE needs to examine their faulty categorization of limiting direct impacts to physical impacts in the PFEIS. As we commented in the DEIS, USACE is not taking a "hard look" at impacts to the cultural heritage of the proposed project area with this mistaken approach. In addition, the PLP drilling program occurred under the permitting regime of the Alaska Historic Preservation Act (AHPA) and the USACE's Nationwide Permit pre-construction notification process. The AHPA is a state law that does not require tribal consultation or assessment of impacts to cultural resources,

and the USACE failed to consider impacts to cultural heritage under its Nationwide Permitting process despite annual cultural resources reports by the PLP contractor SRB&A stating all cultural resources in the drilling program project area are potentially eligible. The USACE relying on cultural resources research conducted under the AHPA and the agency's own inaction on research occurring under its Nationwide permitting process does not qualify as taking a "hard look" at impacts.

The PFEIS continues to avoid taking a "hard look" at the potential impacts from other mineral exploration projects (Page 4.7-11). NTC (2017) has expressed grave concerns to the USACE before about impacts to Groundhog Mountain, a sacred place, from the Chuchuna Minerals Company's drilling activities. The USACE failed to take a "hard look" at the impacts that had raised concerns by NTC then and appears to be failing to take "hard look" again. The DEIS needs to be revised to properly define direct impacts to cultural heritage.

Throughout this chapter, USACE makes it impossible for stakeholders and the public to understand what exactly each project alternative may impact because the agency predominantly uses counts of resources for the impact assessment. An example of this is in section 4.7.9 Alternative 2—North Road and Ferry with Downstream Dams, which states:

> *In terms of potential modification to the setting, this alternative would cross through areas where there are 23 known locations with indigenous place names (12 are in the footprint), and 54 interview-identified cultural features are present across the landscape, with 26 of them in the project footprint*. (page 4.7-14)

Our question is what are these 23 known locations with indigenous place names and 54 interview-identified cultural features? How are stakeholders and the public supposed to provide meaningful comments when USACE only provides counts? USACE must provide some detail as to what cultural resources the proposed project may impact beyond simple counts. We understand confidentiality may apply to some cultural resources, but the place name data is all from publicly available sources and USACE can describe the interview identified cultural resources to some degree without revealing specific information that could harm these places. Trying to force stakeholders and the public to evaluate impacts to their cultural heritage solely on counts is itemizing the region's cultural heritage.

Section 4.9

USACE states:

> *Many project features would be removed, reclaimed, or both during closure. Once restoration activities have been completed, impacts on the availability of subsistence resources would be reduced as these areas would revegetate and return to a more natural state*. (page 4.9-6)

It is apparent that USACE has a very different definition of "natural state" than the NTC and other tribal communities. While Western science may call the reclaimed mine area natural, Dena'ina and Yup'ik ways of knowing will view the reclaimed mine area as forever contaminated and unnatural. USACE needs to rely on more than one knowledge system in their impacts evaluation. This divergence in the meaning of "natural state" is highlighted this statement by USACE:

> *. . . there could still be community concerns regarding the perception of contamination and the safety of subsistence resources in communities downriver from the mine site. Beliefs about subsistence resources being contaminated or unsafe can impact the mental and spiritual health of the community and can interrupt the transmission of traditional knowledge and practices. These impacts would be long term, potentially lasting post-closure, and likely to occur if the project is permitted and constructed*. (page 4.9-12)

First, it's not "*could still be*" concerns. Concerns exist now about downriver contamination. Second, believing your community's food supply is unsafe absolutely will impact, not "can" impact, the mental and spiritual health of the community. Believing the food supply that is central to your community's identity is contaminated will disrupt the passing on of traditional knowledge and practice. Finally, these impacts won't "potentially" last post closure; these impacts will last post closure.

The PFEIS analysis of impacts in this section continues to focus on economic variables. The Nondalton Tribal Council voiced concerns in their PDEIS and DEIS comments that the EIS should broaden the impact analysis to include "values, spirituality, a sense of community." The PFEIS reveals that the attempt to address "spiritual ties" in Section 4.9.3.4 consists of three mentions. These few utterances do not come close to taking a "hard look" at the impacts to the values, spirituality, and sense of community. The USACE needs to reevaluate and strengthen the approach to assessing impacts to the values, spirituality, and sense of community in the PFEIS.

Section 4.27

In response to our comments on the DEIS, USACE has included cultural resources in the spill risk discussion. Unfortunately, USACE has limited the cultural resources spill risk discussion to "cultural resource *[i.e.*, archaeology] sites" and effects on National Register eligibility. USACE offers no explanation of spill impacts on ancestors' graves, traditional use areas, sacred and spiritual places, and locations with Indigenous place names. USACE must broaden its consideration of spill impacts to include all type of cultural resources, not just archaeology sites.

In the subsections addressing potential impacts to water from spills and contamination, the DEIS limits the analysis to the physical environment and fails to consider potential impacts to the cultural environment. While the DEIS does address potential impacts to subsistence, the DEIS casually writes off these impacts by repeating a variation of the phrases, "*Quick response and containment of the spill would help ease concerns about contamination for subsistence users in nearby communities" and "Quick response and containment of cleanup, . . . testing wild foods and communicating the results to local people in a timely manner could help mitigate contamination concerns*" in each of the subsistence sections in this section. The PFEIS's repetitive response continues to grossly underestimate the potential impacts a spill or contamination could have on the Dena'ina, Yupiit, and Alutiit in the proposed project area. The waters of the proposed project area are sacred. The waters of Iliamna Lake, Koktuli River, Upper and Lower Talarik Creek, and countless other lakes and creeks serve as sources of drinking water, the basis for a traditional way of life dating back thousands of years, and religious ceremonies.

In the Pebble Project Environmental Baseline Document for Bristol Bay Subsistence and Traditional Ecological Knowledge (SRB&A 2011), residents from every community studied reported concerns about contamination and spills. Kokhanok residents describe the potential cultural impacts from spills and contamination in Iliamna Lake this way:

> *My main concern is the water. That is what we drink from; we get our fish from there. That is one thing that I don't want ruined is the water, the freshwater*. (SRB&A Kokhanok Interview May 2005)

> *I'm concerned about the salmon, that's our life right there. If our lake dies, I think we are all going to die. Here, we can't get any water, and that's why we have that pipe in the lake. We have too much iron in the ground water. Water is the biggest concern. And fish, but there are other areas I think it could affect: the plant life and stuff. All the water will go to all the animals and we will be affected*. (SRB&A Kokhanok Interview May 2005)

One New Stuyahok resident succinctly stated the cultural importance of the region's water this way:

> *Water gives off life to every living thing. Water is so precious. I wouldn't trade water for one [piece of] gold. Water should never be impacted*. (SRB&A New Stuyahok Interview April 2005)

In the following quote, an Igiugig resident gives voice to the potential that residents may abandon harvesting salmon, a central tenet to their cultures, if there's a spill in Iliamna Lake:

> *This [the Kvichak River] is our only outlet; there's no other way to get into the lake. There's Lake Clark but it drains down into here. If something happens here [in Iliamna Lake], we will be buying salmon in a can.* (SRB&A Igiugig Interview May 2005)

The sacredness of water and salmon are interconnected. Abandoning salmon subsistence would decimate the people of the proposed project area. Buying canned salmon is not a viable replacement for harvesting your own salmon as your ancestors have done for thousands of years. Spills and contamination will have cultural implications regardless of size and how quickly they're cleaned up.

Dr. Boraas and Dr. Knott further in the Environmental Protection Agency's 2014 Bristol Bay watershed assessment appendix *Traditional Ecological Knowledge and Characterization of the Indigenous Cultures of the Nushagak and Kvichak Watersheds, Alaska* explain the interconnected sacredness of salmon and water to the residents of Bristol Bay this way:

> *They continue to practice a first salmon ceremony paying homage to the first salmon caught in the spring and the renewal of their cycle of life. The rivers are blessed by priests annually in the Great Blessing of the Water at Theophany, celebrating the baptism of Christ and symbolically purifying the water of contamination preparing it for the return of the salmon. This ceremony, for Orthodox Yup'ik and Dena'ina, is the pure element of God expressed as sanctified nature. The holy water of the rivers derived from this ceremony is used to bless the homes, churches, and people and is believed to have curative powers.* (pages 2-3)

It is readily apparent from the concerns raised by residents in interviews with SRB&A (2011) on behalf of the Pebble Project for their Environmental Baseline Document for Bristol Bay Subsistence and Traditional Ecological Knowledge that residents expect the proposed project to contaminate the water. If the project is built, there will be spills and contamination; perhaps the spills will be

small, perhaps they will be big. Regardless of size and how quickly the spills are cleaned up, the spills will confirm residents' concerns about contaminating the water, adding to the perception the water is unsafe because of the mine. According to Russian Orthodox clergy V. Rev. Alexi Askoak, "*human-caused pollution and other contaminants … are a form of sin*" (Boraas and Knott 2013:129). The concerns and perceptions of this "*sin*" from the proposed project are stressful and impact cultural beliefs the PFEIS must analyze in this section and sections 3.7, 3.9, 4.7, and 4.9.

Chapter 5

The PFEIS continues to propose a Cultural Resources Management Plan (CRMP) in Section 5.2.1.2 (Pages 5-4, 5-13 Table 5-2) to mitigate impacts to cultural resources. CRMPs are not mitigation. CRMPs are a way to put off decisions about cultural resources until after a project has been approved when there is little to no chance the project proponent will change their alternatives for the sake of preservation (King 2012). The PFEIS (Table 5-2, Page 5-13) proposes developing the CRMP as part of the Section 106 consultation process, which suggests there will be some language in the Programmatic Agreement in which the tribes will have no enforceable role, because the tribes will not be Signatories or Invited Signatories. The USACE needs to consult with tribes about appropriate ways to avoid, minimize, and mitigate impacts to the tribes' cultural heritage prior to permitting decisions, not afterwards (54 USC 306108).

In Table 5-2, the PFEIS continues to propose and mischaracterize monitoring by stating:

> *Cultural experts during construction [that] would eliminate or reduce the potential for the loss or destruction of cultural resources during construction activities through quick identification, preservation, and/or curation of artifacts.*

What this suggests is the Pebble Project will employ monitors to watch over construction. Monitoring does not "eliminate or reduce the potential for the loss or destruction of cultural resources." As we commented on the DEIS, monitoring is a last-ditch effort to identify archaeological sites as construction activities expose them, destroying parts of the site in the process. The archaeologists then come in and dig, document, and destroy the rest of the site so construction can continue. Monitoring is not mitigation; it is a means to construction and destruction of an archaeological site.

None of the proposed cultural resources mitigation described in the PFEIS detail (1) measures to address potential interruption to traditional travel routes; (2) ways to mitigate potential impacts to cultural landscapes and districts that reflect the interconnectedness of cultural resources in region; (3) measures which avoid and minimize disruption of cultural practices in traditional use areas and sacred places; and (4) the role that tribes have in developing mitigation measures.

The proposed mitigation described in the PFEIS for subsistence continues to largely consist of informing communities of what's going on and when during construction and operation instead of implementation of actual mitigation measures to avoid and minimize potential impacts to customary practices and traditional uses. This is a significant failure in the PFEIS.

Conclusions and Recommendations

The USACE has continued its failure to take a "hard look" at numerous and significant aspects of the cultural heritage in and around the proposed Pebble Project. USACE's failure to take a "hard look" continues to result in an inadequate analysis of cultural, historic, and subsistence resources that make up the cultural heritage of the proposed project area. This technical review addresses the USACE's failures in taking a "hard look" at the region's cultural heritage and the impacts to it in their Pebble Project PFEIS. The USACE needs to re-evaluate its analysis of the region's cultural heritage in Sections 3.7, 3.9, 4.7, 4.9, 4.27, and 5.

The PFEIS contains the following objectionable statement:

> *Many project features would be removed, reclaimed, or both during closure. Once restoration activities have been completed, impacts on the availability of subsistence resources would be reduced as these areas would revegetate and return to a more natural state*. (page 4.9-6)

It is apparent that USACE has a very different definition of "natural state" than the NTC and other native communities in Bristol Bay. While Western science may call the reclaimed mine area natural, Dena'ina and Yup'ik ways of knowing will view the reclaimed mine area as forever contaminated and unnatural. USACE needs to rely on more than one knowledge system in their impacts evaluation. This divergence in the meaning of "natural state" is highlighted this statement by USACE:

> *. . . there could still be community concerns regarding the perception of contamination and the safety of subsistence resources in communities downriver from the mine site. Beliefs about subsistence resources being contaminated or unsafe can impact the mental and spiritual health of the community and can interrupt the transmission of traditional knowledge and practices. These impacts would be long term, potentially lasting post-closure, and likely to occur if the project is permitted and constructed*. (page 4.9-12)

First, it is not "*could still be*" concerns. Concerns exist now about downriver contamination. Second, believing your community's food supply is unsafe absolutely will impact, not "can" impact, the

mental and spiritual health of the community. Believing the food supply that is central to your community's identity is contaminated will disrupt the passing on of traditional knowledge and practice. Finally, these impacts will not "potentially" last into post closure; these impacts will last through post closure.

After completing this evaluation of potential impacts to cultural, historic, and subsistence resources that make up the cultural heritage of the proposed project area, the USACE needs to revise the PFEIS and reissue the document for review by the Native Village of Nondalton and other cooperating agencies. The USACE then needs to release the revised DEIS for another public review and comment.

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MEMORANDUM

DATE: March 18, 2020

Prepared By: Teresa Michelsen, Ph.D., Principal Scientist

SUBJECT: **PFEIS Response to Technical Memorandum No. 3 (June 1, 2019) Incomplete and Inadequate Evaluation of Cumulative Impacts Proposed Pebble Project**

This memorandum provides an assessment of whether significant comments on the cumulative impacts assessment in the Pebble Project DEIS were addressed in the PFEIS or remain applicable to the PFEIS. Overall, I find that most of the comments previously provided on the cumulative impacts analysis in the DEIS have not been addressed, and that key deficiencies remain in the PFEIS.

As noted in our previous comments, the cumulative impacts of the 20-year project are substantial and unacceptable, and the impacts are only the tip of the iceberg because of the clear intent that this scaled-back first phase of the proposed project would provide the infrastructure needed for the full build-out of the Pebble Mine, and for other mining projects to use. This "foot in the door" project will irrevocably change the landscape of this region from wilderness to industrial, and from a subsistence-based culture to a fossil fuel-based Western economy dependent on resource extraction. The impacts these changes will have on fish, wildlife, subsistence lifeways, recreation, and coexistence with the landscape cannot be overstated and are of paramount concern to neighboring Alaska Native communities and hundreds of thousands of other Alaska residents who took the time to comment on the DEIS. Yet, these concerns are barely acknowledged and only superficially addressed in the PFEIS.

Below, each of the key comments previously provided on the cumulative impacts assessment in the DEIS are reviewed to determine whether and to what extent they were addressed in the PFEIS. After each comment my assessment of how it was addressed is shown in bold blue text.

Major Comments

Key Impacts and Cumulative Impacts of the Proposed Project

The current order in which the elements of the environment are presented and discussed is not helpful to evaluating key impacts on individual elements or combined impacts on higher-level

Expert Agency Comments on Pebble Preliminary Final EIS, Page 292 of 369

Return to Excerpt

receptors. Basic elements of the environment, such as soil, sediment, groundwater, surface water, and air should be discussed first. Geologic hazards and the risk of spills and major releases should then be discussed.

The extent to which these foundational elements of the environment are impacted will provide a basis for understanding impacts to organisms that directly live in and subsist on these media, such as invertebrates and plants. Species that in turn subsist on these lower trophic levels should be discussed next, such as fish and birds, followed by marine and terrestrial mammals.

Subsequently, impacts to human communities and experience and use of the environment should be discussed. These elements include subsistence use, cultural and spiritual practices, recreational and commercial activities, community well-being, transportation, etc. These elements cannot be understood without first having an understanding of how the natural environment would be affected. Organization of the Draft EIS in this manner would be consistent with CEQ (1997) guidance on presenting and understanding cumulative impacts.

Currently, there are numerous disconnects in the order of sections. For example, impacts on subsistence use and commercial and recreational fisheries are discussed before impacts on fish or impacts on wildlife. Spill risk, which would have a major impact on nearly every component of the environment, as well as human uses, is discussed last and referred to in multiple previous sections. This should be one of the first sections presented, since so much else depends on it.

As we have commented previously, impacts on subsistence ways of life, the cash economy, and the well-being of the community cannot be separated in this DEIS, as they are inextricably related. At the very least, these sections should be placed adjacent to one another. There are numerous additional examples that could be mentioned. The structure of the DEIS should be reviewed and the elements of the environment presented in a more logical order. There is no clear rationale for the order of the sections, which seems designed to make it difficult to evaluate the linkages among elements of the environment.

Subsistence use may be affected by changes in the amount of resources, the spatial or temporal pattern of resources, access to resources, contamination of resources, and socio-economic factors, as well as generational effects on cultural knowledge and practices. In each case where an important resource or human use may be impacted by a number of different factors related to the proposed project, to the extent possible, those elements of the environment should be presented first and then the combination of those impacts on the higher-level resource or use assessed.

No changes were made to the order of the sections. The former Sections 3.8 and 4.8 related to Historic Properties were moved into Sections 3.7 and 4.7 regarding Cultural Resources in response to comments that historic properties are cultural resources. However, although these sections now appear in the same chapter, the discussions of the two are not combined in any way. Discussion of subsistence lifeways and the cash economy are still in separate sections (each with limited text acknowledging the other section), and spill risk is still discussed after all other sections.

Aside from general clarity, this type of presentation is important so that the cumulative effect of different types of impacts on higher-level species and uses can be integrated into a single discussion. Fish may be affected by water quantity, water quality, sediment quality, habitat quality (e.g., riparian cover), loss of spawning habitat, modifications to stream channels or substrate, culverts and bridges, incidental spills, and large-scale releases.

Some attempts have been made to acknowledge a wider variety of potential impacts to fish, but no integrated assessment of the various stressors to fish populations is provided. A couple of paragraphs were added to Section 4.1 acknowledging interrelationships among elements of the environment, but integrated assessments are not presented in the following sections.

An integrated summary of key impacts to each element of the environment, along with unavoidable adverse effects and irreversible or irretrievable commitments of resources, should be presented at the end of Chapter 4, in its own section. This "at-a-glance" summary would present the overall impacts of the proposed project, along with any differences among the alternatives, in a clear and understandable manner. This summary of key impacts would also provide the foundation for a subsequent discussion of cumulative impacts, which should be placed in a separate chapter with its own summary of cumulative impacts at the end of that chapter.

Key impacts and cumulative impacts of the alternatives are not summarized in once place in the document, nor are the two tables located together within individual sections. Both key and cumulative impacts are piecemealed by type of impact, alternative, and each additional type of reasonably foreseeable future actions (RFFAs)**. There is no integrated discussion or summary of cumulative impacts within each chapter or overall.**

Spatial and Temporal Impacts

Throughout Chapter 4, cumulative impacts are described as having the same areal scope as the DEIS Analysis Area. However, this is not the case. When RFFAs are considered, the spatial area of impact is significantly larger and includes additional watersheds. The DEIS should explicitly describe, ideally

on a map but at a minimum with acreage, river miles, by vegetation or habitat type, etc., the spatial extent of the combined RFFAs and compare it to that of the proposed alternative.

Additional description of the expanded mine scenario has been added to Section 4.1. Limited quantification of the impacts of the expanded mine scenario (but not other RFFAs) was included in a few sections where it is most obviously relevant for regulatory purposes, such as wetlands and fish values. Most sections still contain qualitative discussions.

Similarly, the time periods associated with the RFFAs differ from that of the proposed project. While this is acknowledged in the DEIS, time periods are often discussed and compared including only the development and operational timeframes of the projects. The closure periods, including full disclosure that some impacts and operations will occur in perpetuity, should be more clearly discussed.

The response to comments (e.g., on Air Quality) inaccurately states that only impacts that overlap in time between the proposed project and RFFAs are considered to present increased impacts. An increased duration of similar impacts (even by decades) is not considered a cumulative increase if it does not occur within the project operational period. This approach allows the USACE to claim that impacts of RFFAs, including the Pebble Mine buildout, would be "similar" to those of the proposed project.

Temporal impacts to living elements of the environment should take into account the lifecycle or generational timeframe in comparison to that of the proposed project or RFFA. An impact that would occur over less than one generation or lifecycle would have a less significant cumulative impact than one that occurs over multiple generations or lifecycles. If continued impacts occur over multiple lifecycles, the population of a resource may reach a threshold below which it is unable to recover and be irretrievably lost. Descriptors such as "short-term" or "long-term" are too vague to adequately describe this comparison, particularly since various organisms and human generations have different lifetimes. For example, a 3-year period may be relatively short for a bear or a human, but long for an invertebrate community or fish population.

The PFEIS more carefully defines the meaning of the terms used for various time periods in the document and some additional categories have been added for specific impacts, but the duration and manner in which the time periods are considered relative to receptors have not changed.

Exploration RFFAs

Section 4.1 of the DEIS describes the types of impacts assessed, including cumulative effects. With respect to RFFAs, the DEIS states, "the likelihood that a specific RFFA would occur must also be assessed." The very high likelihood that the Pebble Mine Expanded Development RFFA would be enabled by this project, and indeed may be the only scenario in which the Pebble Mine would be financially feasible, is of great concern to surrounding communities and should be discussed in a straight-forward and transparent manner.

USACE states that it considers Pebble Mine expansion reasonably foreseeable. However, it does not address in the PFEIS the fact that this RFFA is dependent on the Proposed Project, and adequately consider the impacts of the Proposed Project in light of enabling the expanded project. In other words, they are not two separate projects that happen to coexist. Comments that the two stages of the project should not have been treated as separate alternatives were rejected.

The DEIS makes a blanket determination that all of the other mining projects surrounding the proposed project would only go forward with exploration, but not development. However, there would be no purpose for continued exploration if those project proponents did not believe there might be something worth developing in the area.

Many of these additional projects were included in USEPA's evaluation of cumulative impacts for the previous Pebble Mine proposed project (USEPA 2014), yet none are included in this DEIS for development, despite both assessments covering essentially the same timeframe. For this reason, among others, the current DEIS is deficient and should be substantially revised and reissued. The DEIS should assume that at least some of these projects would be developed in the 90 plus year timeframe of the Pebble Mine Expanded Development RFFA and evaluate cumulative impacts accordingly.

USACE has stated that it is not constrained by previous analyses (such as EPA's Bristol Bay Watershed Assessment), and that its experts have reached a "different conclusion." No explanation of why a different conclusion was reached is provided, or why EPA's analysis should be disregarded. Several of the screening criteria seemed designed to limit the number of additional projects evaluated, such as being in a current permitting process and having dedicated funding. By that measure, the applicant's proposed project would not be considered reasonably foreseeable, since it does not yet have funding.

Indeed, development of either the proposed project or the Pebble Mine Expanded Development RFFA increases the probability that many of these other projects could proceed past the initial

exploratory stage, since they would make use of the same infrastructure installed for the Pebble Mine. Facilitating other mining projects, with their inevitable additional short-term, long-term, and cumulative impacts to the environment and subsistence, cultural, commercial and recreational resources, is one of the most concerning aspects of the proposed project and must be more thoroughly and properly evaluated.

No changes were made in response to this comment.

Metrics for Cumulative Impacts

In the various sections of Chapter 4, cumulative impacts of the Pebble Mine Expanded Development RFFA and other RFFAs are described in varying levels of detail and in varying formats compared to the proposed project. Sufficient information is available on the Pebble Mine Expanded Development RFFA (in some areas more than the proposed project) that there is no reason this RFFA could not be described in the same manner as the proposed project. This is particularly important since this is the most likely RFFA to be developed in the near-term and its environmental impacts are substantial.

Limited quantification of the expanded mine scenario (but not other RFFAs) was included in a few sections where it is most obviously relevant for regulatory purposes, such as wetlands and fish values. Most sections still contain qualitative discussions.

In most of the sections of Chapter 4, there is a table showing the key impacts associated with the proposed project and its alternatives, usually in a quantitative manner. For example, acres of wetlands filled, river miles of streams lost, modeled concentrations of metals in groundwater or surface water, numbers of stream crossings, etc. All or nearly all of this information exists for the Pebble Mine Expanded Development RFFA and should be clearly described in a revised version of the DEIS.

Tables of cumulative impacts have been added to each subsection, similar to the tables of key impacts. Only some of these tables contain quantitative information, most are still narrative and mainly contain the text that was previously in the subsection.

In a separate chapter, tables of cumulative impacts should be presented showing the no action alternative, the proposed project, the Pebble Mine Expanded Development RFFA, and any other RFFAs considered likely to be developed. For each element of the environment, the tables should compare each quantitative metric using the same units used to evaluate the alternatives. The tables should also contain quantitative spatial and temporal comparisons of the RFFAs to the proposed project.

A recommended format for this table would be similar to the key impacts tables currently in each section but comparing the impacts of the proposed project to those of the proposed project plus RFFA(s). Impacts of past and present activities could be included in the first column, representative of the no action alternative. References should be provided for all values in the tables. See for example Table 4-3 of the Council for Environmental Quality (CEQ) (1997) cumulative impacts guidance, but with greater detail.

A chapter has not been provided that summarizes key impacts of the alternatives or cumulative impacts of the project alternatives with RFFAs. The cumulative impact tables are not formatted in such a way as to allow easy comparison of the RFFAs with each other or the proposed project by impact or element of the environment.

In most cases, only Alternative 1 need be shown for the proposed project, since the differences among the DEIS alternatives are often much smaller than the difference between the No Action Alternative, Alternative 1, and the Pebble Mine Expanded Development RFFA. Any alternative-specific differences could be mentioned in the text or presented as a range, without repeating all the detail as is currently done. This would provide a clearer idea of the relative magnitude of the Pebble Mine Expanded Development RFFA compared to the proposed project and provide support for the narrative comparative statements currently in the text.

No changes were made in response to this comment.

Impacts of the Pebble Mine Expanded Development RFFA

Tables of quantitative metrics as described above would clarify the magnitude of the cumulative impacts associated with the RFFAs. In addition, the text describing the impacts associated with the Pebble Mine Expanded Development RFFA is currently vague and misleading and needs to be revised for accuracy.

Specifically, there are statements throughout the sections of Chapter 4 similar to the following, "[t]he Pebble Mine expanded development scenario would increase the geographic area affected by the project by combining elements of Alternatives 1 and 3." This is manifestly inaccurate. Perhaps the transportation elements of the expanded development would be similar to a combination of Alternatives 1 and 3, but the mine itself and all associated impacts would be very much larger.

The mine expansion project is more clearly described in terms of size and duration for various elements of the environment, and a more complete description of the project has been added

to Section 4.1. Quantitative metrics for impacts are mainly included under Fish Values and Wetlands.

There are a number of other vague and general statements that minimize the footprint or impacts of the Pebble Mine Expanded Development RFFA, such as the following in the critical Spill Risk section, ". . . the cumulative effects of unintentional releases associated with Pebble mine expansion would be similar to those discussed previously in this section, but potentially involve larger volumes over a *slightly larger* geographic area [emphasis added]." The same section claims that there would be no added spill risk from oil and gas exploration. These claims are clearly unlikely on their face, and, like most of the statements in the cumulative effects sections, are not referenced to any supporting documentation.

This section has been modified, but still reads "In the event of a release of pyritic tailings, the increased volume of storage could result in a larger volume of release, slightly increasing the chance of contamination in the UTC…" [emphasis added].

Under Surface Hydrology, the following statement can be found regarding the Pebble Mine Expanded Development RFFA, "[t]he magnitude of cumulative impacts to surface water hydrology would vary from temporary to permanent, increasing potential streamflow reductions in the SFK, NFK, and UTC watersheds beyond those described under Alternative 1." This statement is quite uninformative. The phrase "from temporary to permanent" is all-encompassing of essentially any level of impact, and the sentence does not describe the extent of streamflow reductions in these watersheds, which were almost certainly modeled as part of the previously proposed project.
The USACE should examine the DEIS carefully and remove any vague and uninformative statements, replacing them with clear quantitative information that is supported by and cited to the existing documentation regarding the Pebble Mine Expanded Development RFFA.

The statement above regarding surface hydrology and many others like it still remain in the PFEIS.

Similarly, the USACE must refrain from drawing conclusions regarding the Pebble Mine Expanded Development RFFA that could be construed as regulatory determinations or that contradict previous agency findings regarding the project that remain on the record. As one key example, the USACE should not conclude that fisheries populations (subsistence, recreational, or commercial) would not be impacted by the Pebble Mine Expanded Development RFFA without presenting any documentation of such and receiving concurrence from other regulatory agencies with jurisdiction over these resources.

USACE has stated that it is not constrained by previous analyses (such as EPA's Bristol Bay Watershed Assessment), and that EPA's assessment was for a "hypothetical" project that is not the same as the applicant's project. USACE provides no assessment of whether the two are similar enough that EPA's conclusions regarding fisheries and other impacts should be given substantial technical weight in this FEIS.

Detailed Comments

The following detailed comments are provided on specific subsections of Chapter 4, in addition to the general comments provided above. These comments do not repeat the themes discussed above but provide additional, more specific comments.

Section 4.1.6. Unavoidable Adverse Impacts

Evaluation of unavoidable adverse impacts is required by federal statute, but only this paragraph in the entire DEIS mentions them. The tables of key impacts in later sections cannot substitute for this evaluation, since there is no discussion of whether those key impacts could be avoided or mitigated if the project or alternatives were designed differently. Unavoidable adverse impacts should be clearly identified in the tables of key impacts and a description provided of why they are unavoidable.

No changes were made in response to this comment.

Section 4.1.7. Irreversible and Irretrievable Commitment of Resources

This section is at best a cursory and general list of resources that may be irretrievably committed to the proposed project. It does not provide nearly enough information to be of any use and does not differentiate among the alternatives. There is no further discussion of these resources in any of the subsequent sections of this chapter.

As noted in the introduction to this section, federal statute requires an "evaluation" of these resources, not a general list with no further discussion, quantification, or references. A section addressing irreversible and irretrievable commitment of resources should be added at the end of Chapter 4, once all impacts have been discussed. The amount of resources irretrievably committed should be identified quantitatively, with the basis for the estimate referenced, and all alternatives, including the no action alternative, should be included.

No changes were made in response to this comment.

Section 4.2.6.2. Reasonably Foreseeable Future Actions, Road Improvements and Community Development Projects

The first paragraph of this section states, "[o]ther community development and infrastructure projects would contribute to a slow land use change in the region, from undeveloped, generally natural landscapes to more industrial use and resource extraction. Transportation, infrastructure, energy, and utility RFFAs would also contribute to the slow transition of land use toward a more developed land use scenario with more prevalent industrial, commercial, and transportation land uses."

This characterization is deeply misleading, portraying relatively small community improvement projects as leading to inexorable development of a landscape dominated by industry and mining. This is certainly not the wish or intent of local communities for their environment and reflects a viewpoint more aligned with international corporations bent on resource extraction. The biased portrayal of this supposedly inevitable land-use transformation should be revised and a clearer comparison of the relative size of these small projects to the more massive proposed mining projects presented.

This language still remains in Table 4.2-2, but the following sentence has been added, "The changes would be in or near communities and would have a small effect to the overall project area."

Section 4.4.6.2. Subsistence, Alternative 1, Pebble Mine Expanded Development Scenario

A statement is included in this section as follows, "the additional habitat loss associated with the mine site would not be expected to have population level effects on fish and wildlife…" This is a sweeping statement without any references to support it and contradicts comments and findings of other agencies. Additionally, habitat loss from development of the mine site itself would not be the only aspect of the project that could contribute to population-level impacts on fish and wildlife.

Like most of the conclusions in these sections, no references are provided to allow the reader to evaluate the USACE's conclusions in regard to the cumulative impacts of the RFFAs. These sections are remarkably devoid of references, analysis, or support by other agencies with regulatory jurisdiction over these resources. This statement in particular and other conclusory statements like it (e.g., see Section 4.23 Wildlife Values and Section 4.24 Fish Values) should be struck, revised, or supported by adequate scientific analysis and documentation.

No changes were made in response to this comment.

Section 4.5. Recreation vs. Section 4.4. Subsistence

All of the impacts described in this section would also impact subsistence and cultural uses of fish, wildlife, and the landscape. Yet, many of these impacts are not described in the Subsistence Use section. This is just one example of how various impacts are divided up into sections and assessed in a fragmented manner without acknowledging all of the possible impacts that may affect subsistence and cultural uses. Piece-mealing impacts in this manner is unacceptable; the Draft EIS should be reorganized as described in the general comments and *all* impacts to Subsistence discussed in a comprehensive manner.

No changes were made in response to this comment.

Section 4.9. Subsistence

Please remove all statements implying that mining income is necessary or beneficial to subsistence activities. This is offensive and incorrect. Subsistence activities have been carried out for millennia without the need for support by industrially derived income. Any income provided by mining activities is a poor recompense for the loss of subsistence resources and opportunities that would occur under any of the Pebble Mine scenarios.

No changes were made in response to this comment.

Section 4.12. Transportation

Please provide an estimate of the amount of additional truck traffic that would occur as part of the Pebble Mine Expanded Development RFFA compared to the proposed project to put the expected impacts in better context.

The discussion of truck traffic remains narrative rather than quantitative.

Section 4.14. Soils

This section on cumulative impacts contains a statement as follows, "[t]he magnitude of cumulative impacts to soil would vary from temporary soil disturbance to permanent soil removal. Similarly, erosion would vary from minimal surface stabilization efforts to indefinite erosion maintenance." This is the type of vague and general statement that carries little value in evaluating the extent of impacts associated with an RFFA. Please include quantitative metrics for various levels of impacts.

The statement remains; brief examples of the levels of impact have been added.

Section 4.15. Geohazards

In reference to the Pebble Mine Expanded Development RFFA, this section claims that, "[t]he magnitude of potential geohazard-related impacts would be similar to the proposed project, with added stability risk and potential cumulative effects on the Upper Talarik Creek (UTC) drainage due to the large waste rock pile that would be required in the buildout scenario."
The Pebble Mine Expanded Development RFFA cannot be claimed to be similar to the proposed project in the magnitude of its geohazard risk. While this is acknowledged for one element of the project, the language is quite vague and provides no details, estimates, or descriptions of the additional stability risk or impacts that could result from a failure.

The statement has been revised to reflect the changes in the project, but the comparison to the impacts of the proposed project as similar remains.

Section 4.20. Air Quality
Total climate emissions from the proposed project should be summarized in the Key Issues table and compared to cumulative emissions from the RFFAs, particularly the Pebble Mine Expanded Development RFFA. The statement that these emissions would be substantially the same is difficult to credit, given the much larger size of the Pebble Mine Expanded Development RFFA.

Estimates of greenhouse gas emissions are presented in Appendix K4.20, without description of the methodology or comparison to RFFAs.

M E M O R A N D U M

DATE: March 16, 2020

FROM: Teresa Michelsen, Ph.D., Principal Scientist

SUBJECT: **PFEIS Response to Technical Memorandum No. 3 (June 1, 2019) Technical Review of the Preliminary Final Environmental Impact Statement (PFEIS) for the Proposed Pebble Project**

The U.S. Army Corps of Engineers (USACE) Alaska District released the subject document on February 6, 2020. This memorandum provides comments from our review of the PFEIS with a focus on serious flaws and major deficiencies in the PFEIS and its conclusions.

The need for this project has not been demonstrated.

Section 1.5 of the PFEIS describes the purpose and need for the project. The purpose stated by the Pebble Limited Partnership (PLP) for the permit application is "*to produce commodities, including copper, gold, and molybdenum, from the Pebble deposit in a manner that is commercially viable, using proven technologies that are suitable for the project's remote location*." To achieve this purpose, PLP requests authorization to discharge fill into and place structures in over 3,000 acres of waters of the United States based on a 20-year plan, most of which would result in direct, permanent losses of these waters and wetlands. As noted below, adequate compensatory mitigation for these impacts, in compliance with the 2008 Joint Army-USEPA Mitigation Rule, has not been identified. The study/permit area is widely acknowledged as being relatively pristine. The PFEIS and the Draft Compensatory Mitigation Plan both acknowledge this fact and state that it will be impossible to restore, enhance, or establish compensatory mitigation projects to replace functional losses caused by the proposed project.

For the USACE to grant a permit for the Proposed Pebble Project, the USACE must demonstrate that the proposed project (1) complies with the Clean Water Act (CWA) including Section 404(b)(1) Guidelines and applicable regulations and (2) is "not contrary to the public interest."

As discussed in this memorandum, the proposed Pebble Project is contrary to the public interest, in large part because the proposed project would have significant adverse effects with respect to

all 21 Public Interest Review Factors specifically, and if implemented, the proposed project would result in significant degradation to Waters of the United States.

The Applicant has not demonstrated a public need for the proposed project. The minerals proposed to be mined are not in short supply globally, and demand is declining for some. The minerals are not particularly strategic or in short supply nationally. In fact, as the PFEIS states, these "*are not mineral commodities considered to be critical to the economic or national security of the US*." No global or national needs analysis has been provided that would suggest that anyone has an economic interest in this mine being developed other than the Applicant. To the contrary, several local and tribal governments have expressed a wide variety of serious concerns regarding economic, cultural, and health impacts that the proposed project may bring to their communities that would be uncompensated and un-mitigable.

A variety of existing economic opportunities (valued at over $1.4 billion annually) in the region would be adversely impacted by the proposed project, including subsistence fishing, hunting, and gathering; recreational hunting, fishing, and wildlife viewing and associated guiding and lodging; commercial fisheries; and other economies that rely on the pristine and wild condition of this area. Nevertheless, this PFEIS and the Applicant make much of the few local jobs that would be created by the proposed project and the supposed economic benefits these would provide, for at most 20 years, in exchange for permanent loss of the landscape (in perpetuity) that has supported the tribes and indigenous people for millennia. In the judgment of the Nondalton Tribal Council (NTC), and other tribal governments of the Bristol Bay region, a few short-term jobs will not make up for the loss of existing jobs; loss of cultural, spiritual, and subsistence resources; and the deprivation of the continued existence of tribal communities on the land that they have enjoyed for thousands of years.

The risks that the proposed project poses to downstream world-class fisheries, regional wildlife, and birds are unacceptably high. The mine and its burgeoning infrastructure will destroy, degrade, and fragment the landscape in this relatively pristine regional ecosystem. The PFEIS does not recognize or evaluate the interactions among the constituent parts of this ecosystem and does not describe and evaluate the critical importance of headwater streams and wetlands in maintaining the natural functions of the whole ecosystem including healthy salmon populations. If permitted and implemented, the proposed project would cause significant and irreversible degradation across seven watersheds.

The Purpose and Need Statement was inappropriately modified by the USACE.

The purpose of this project was clearly stated by the Applicant as their desire to mine the Pebble deposit. However, the PFEIS states that, "*The USACE has determined that the Applicant's stated purpose is made too narrow by limiting the proposed development to the Pebble deposit. The public's interest in commodities such as copper, gold, and molybdenum does not dictate a particular source of these commodities and the public has also expressed an interest in protecting the state's natural resources, such as fisheries*." The NTC may agree with this statement; however, the USACE then modified the project purpose: "*to develop and operate a copper, gold, and molybdenum mine in Alaska in order to meet current and future demand.*"

First, as noted above, it is not clear that there is global, national, or local demand for these minerals that cannot be met by existing and proposed projects already under development or in operation elsewhere. No analysis of the supply and demand for these metals has been presented in any detail, nor is there any suggestion that there is a supply emergency that would justify such significant, permanent, and un-mitigable impacts to the ecological and cultural landscape. There clearly is no specific demand for these minerals within Alaska, as the industries that use them are not generally located in in Alaska. The profits from this enterprise would flow to international corporations rather than to businesses located within the U.S. As such, it is unclear why there would be a need for such a mine located specifically in Alaska. Alternatives elsewhere in the U.S., Canada, or other countries worldwide could just as easily supply the actual demand, yet none of these alternatives were presented or analyzed in the PDEIS, DEIS, or PFEIS.

A reasonable range of alternatives was not evaluated for either the Applicant's original purpose and need nor the USACE's modified purpose and need.

By artificially limiting project alternatives to the State of Alaska, the USACE was able to systematically eliminate all other alternatives to the proposed project, in some cases on the weakest of pretexts. For example, projects were eliminated solely because they contained copper and gold, but not molybdenum. However, there is no economic requirement for all three minerals that happen to be present in the Pebble deposit to also be present in other alternatives. Other mines were eliminated due to not having yet been as thoroughly investigated as the Pebble deposit. This appears to be a requirement aimed at allowing the Applicant to recoup the cost of their exploratory ventures, rather than providing a fair, objective screening process. In this manner, alternatives within Alaska that could have posed significantly fewer adverse environmental and cultural impacts were all eliminated, and no other equally or more viable alternatives anywhere else were considered. Because the USACE has inappropriately constrained the development and evaluation of a reasonable range of alternatives, the USACE cannot now claim that they really

know what the "Least Environmentally Damaging Practicable Alternative" is, and this is the only alternative they can consider permitting or authorizing under current laws and regulations.

Despite the USACE's stated determination that limiting the alternatives to the Pebble deposit is inappropriately narrow, the USACE deliberately and arbitrarily allowed the Applicant to eliminate other reasonable alternative using a variety of locational and operational preferences identified by the Applicant.

The proposed project has been continually modified throughout the EIS process, and several key reports and design documents describing the proposed project have not been available during the EIS review process.

A total 40 significant documents responding to requests for information were uploaded to the USACE project website in the week prior to release of the PFEIS. Another 14 documents were uploaded during January 2020, and 91 additional documents were uploaded in the second half of 2019. A total of approximately 145 documents were uploaded after the close of the public comment period on the DEIS, most of which were uploaded within 60 days to a week of releasing the PFEIS. Some of these documents were received by the USACE just days before release of the PFEIS and could not have been adequately reviewed or incorporated into the evaluations and findings of the PFEIS within the time allowed.

Technical comment response and resolution meetings were held with cooperating agencies just three weeks after about half of these documents were uploaded on October 30, 2019 to address comments made on the DEIS.

Prior to the first technical meeting with cooperating agencies (November 18 – 22, 2019), USACE provided the Cooperating Agencies with a list of 157 key issues that they had identified as requiring discussion and resolution. During this first technical meeting only about a dozen of the issues were discussed, and none were resolved. Recently, USACE held a second technical meeting with cooperating agencies during the week of March 9, 2020. Clearly, USACE understands that it has a very long way to go to discuss, assess, and resolve all the key issues that they themselves have identified. A major concern is that coordination with cooperating agencies has been spotty and ineffective and seems to be many months behind in terms of being able to obtain data, information, and input that should have been included in the PFEIS that was released on February 6, 2020.

There is a pattern of USACE developing its NEPA documents for this proposed project prematurely at each step of the NEPA process. Representatives of the Nondalton Tribal Council, federal agencies, trade organizations, and the public have commented previously that the DEIS is critically flawed because it is based upon very incomplete information, inadequate analysis, and conceptual designs for key aspects of the proposed mine and infrastructure. Additionally, USACE has NOT provided cooperating agencies with a reasonable amount of time to adequately review all the requests for information (RFIs) that have been posted, which include a great deal of important, complex, and highly technical information, including among others:

- Reclamation and Closure Plan
- Water Balance, Groundwater Model, and Streamflow Reduction
- Groundwater Model Validation and Sensitivity Analysis
- Potential Headwaters Stream Dewatering
- Pit Lake Hydraulic Containment
- Comprehensive Water Modeling System
- Dewatering Impacts to Wetlands and Other Waters
- Static Stability Analysis Main WMP
- Fault Sensitivity Analysis – Bulk TSF West Wall
- Pseudo-Static Stability Analysis – Other Embankments
- Cultural Resources Survey Data
- Concentrate Pipeline Concept Description
- North Access Natural Gas Pipeline Route
- 2018 Field Data on Biological Resources
- Operational Measures for Spill Prevention

Even in cases where the information could be discussed in the conversations in an informed and thoughtful manner, only two months remained after the technical meetings concluded before the PFEIS was released, and during this time a large number of additional documents were received from the Applicant. This did not allow adequate time for the USACE to substantively address even the DEIS comments discussed at the November 2019 meetings, much less the new information received in the interim. This compressed and abbreviated schedule is evident in the nature and quality of the revisions, which are mainly in the form of conceptual designs and promises to do the actual engineering and design of major project features when USACE permits and authorizes the project. The PFEIS is based upon concepts and promises rather than substance and scientific evaluation.

Some of the key documents not released until just before the PFEIS was released include:

- Second draft of the Compensatory Mitigation Plan, containing the first substantive details regarding what the Applicant has in mind for mitigation projects (This is labeled as the Final Mitigation Plan by USACE but Applicant titled it Draft.)
- Draft Biological Assessments (prepared by the Applicant and USACE for NOAA and USF&W)
- Draft Essential Fish Habitat Assessment (prepared by the Applicant for the USACE)
- The Watershed Model and Stream Flow Change
- Fish Habitat Modeling Results
- Bulk TSF Closure Design and Post-Closure Stability
- Bridge Construction Techniques
- Monitoring and Adaptive Management Plan
- Fugitive Dust Control Plan
- Invasive Species Management Plan
- Wetlands Temporary and Indirect Impacts
- Scenario of Expanded Development of Pebble
- Water Treatment Process Update
- Air Quality Dispersion Modeling
- Air Quality Emissions Inventories
- Follow up on Seismic Stability Analysis
- Review of Cultural Resources Documents
- Tsunami Design for Port Facilities
- Project Logistics and Employment for Socioeconomics and Transportation

The USACE could not possibly have assimilated all of this important information and carefully integrated it into the PFEIS in the time remaining, hence, the request that a revised draft EIS be prepared and circulated for public comment. Nor is it reasonable to expect cooperating agencies (CAs) to evaluate and comment on the PFEIS with this information provided separately and concurrently, and without being integrated in any way to help CAs, tribes, federal agencies, and others to understand what was added and its significance. Yet, the USACE has made it clear that it does not expect to make substantial revisions or conduct additional substantive work moving forward, which makes no sense and is in violation of NEPA and the USACE's own NEPA implementing regulations (33 CFR 325, Appendix B, NEPA).

The project was clearly evolving during this time frame, even as the public and cooperating agencies were attempting to understand the proposed project and its potential environmental impacts. An 87-page appendix was added to the PFEIS just to summarize the changes in the project description since the DEIS. This document was not submitted by PLP to the USACE until December 2019, so it is unclear how the USACE could have carefully analyzed and fully integrated these project changes into the PFEIS. These significant changes included:

- A substantively different preferred alternative
- Increases in the milling rate and mining duration
- Substantial changes to the water management ponds in size and location
- Changes in the size and location of the tailings storage facilities, affecting different drainage basins
- A completely different engineering design for the port
- Changes to the natural gas pipeline route
- Change in the ferry terminal location

These changes have resulted in a substantially modified project with clearly different environmental impacts affecting different geographic areas than originally disclosed to the public in the DEIS. For example, direct impacts to Bristol Bay rivers and streams increased 25%, according to USACE because of improvements in mapping. However, without time to review how the maps were revised, how additional fieldwork was done, and how aquatic resources were classified, it is impossible to understand exactly what rivers and streams will be adversely affected, and where. Since our review of the DEIS, over 146,000 pages of new information have been added to the

record, much more information than was available at any stage of the review and consultation process, and most of this information was newly released. The USACE needs to take a step back and allow itself, the cooperating agencies, and the public sufficient time to evaluate this new information and to develop the conceptual project designs in designs of sufficient detail to evaluate potential impacts. Otherwise, USACE is, in effect, evaluating and making decisions on an imaginary project, and speculations about impacts to natural and cultural resources. A permit shall not be issued if there does not exist sufficient information to make a reasonable judgement as to whether the proposed discharge will comply with the Section 404(b)(1) Guidelines.

A second Revised DEIS should be prepared that accurately describes the project as currently proposed, identifies and thoroughly evaluates the environmental impacts of the proposed project, and describes the proposed mitigation for these impacts with all of the supporting information carefully integrated into the DEIS. Once the cooperating agencies and the public have been provided an opportunity to review a complete DEIS, then a draft final EIS can be prepared.

The USACE has failed to meet the basic standards of scientific analysis and documentation.

In commenting on the DEIS, NTC noted that sweeping conclusions were made throughout the document that were not supported by data, analysis, or references. For example, the USACE claimed with respect to the reasonably foreseeable future affects (RFFA) of the full Pebble Mine buildout and its impact on subsistence resources that "additional habitat loss associated with the [expanded] mine site would not be expected to have population level effects on fish and wildlife . . . ." This conclusion is clearly contradicted by thorough scientific analysis and well-referenced published reports by USEPA[1] and other agency teams.

This startling claim and others like it led NTC to comment: "Like most of the conclusions in these sections, no references are provided to allow the reader to evaluate the USACE's conclusions... These sections are remarkably devoid of references, analysis, or support by other agencies with regulatory jurisdiction over these resources. This statement and other conclusory statements like it (e.g., see Section 4.23 Wildlife Values and Section 4.24 Fish Values) should be struck, revised, or supported by adequate scientific analysis and documentation."

[1] U.S. Environmental Protection Agency (USEPA). 2014. *An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska, Bristol Bay Wild Salmon Ecosystem: Baseline Levels of Economic Activity and Values*. EPA 910-R-14-001. Region 10, Seattle, WA. January.

The USACE's response to this comment was, "Analytical conclusions by SMEs [subject matter experts] are not subject to references."[2] This departs from longstanding procedures and practices nationally, and for other mines in Alaska, specifically.

Apparently, USACE believes that its experts are so knowledgeable that they do not require data, analyses, or any form of published literature to support their conclusions or opinions. The PFEIS remains similarly vague as to how its conclusions were reached and supported, perhaps because many of the supporting analyses were not actually available when these sections were written and there are still significant data gaps that would need to be filled to draw such far-reaching conclusions.

There is still not a single reference for the conclusions in Section 4.23 and Section 4.24, nor is there a corresponding technical appendix that might provide additional information and analysis supporting the conclusions in these sections. The potential impacts on subsistence resources of the proposed Pebble Project and its clearly foreseeable future buildout is one of the main concerns of Alaska Native communities that live in and rely on the areas that would be affected by the proposed project.

This level of analysis does not rise to a level that is scientifically or legally defensible, and it falls short of the type of analysis required of an EIS. This deficiency is particularly problematic when it involves issues and concerns that are subject to government-to-government consultation. Council on Environmental Quality (CEQ) guidance describes collecting data, building mathematical and GIS-based models, selecting geographic and temporal scales appropriate to the receptor or community impacted, analyzing cumulative impacts, and quantitatively describing the magnitude and uncertainty of the projected impacts.[3] Such analyses remain notably lacking in many critical areas of the PFEIS. Because of the lack of data and information, USACE cannot say with any certainty what the impacts will be and what the LEDPA might be.

The proposed project would have substantial greenhouse gas emissions that are not disclosed or analyzed.

The project's direct greenhouse gas (GHG) emissions are estimated in Appendix K4.20, although no backup for these calculations or context is provided. Section 4.20 states "*while the project's direct GHG emissions are presented in Appendix K4.20, the magnitude of these impacts is not*

[2] U.S. Army Corps of Engineers, Nov. 1, 2019. NTC_comment_response_matrix.xls.

[3] Council on Environmental Quality. 1997. Considering Cumulative Effects Under the National Environmental Policy Act.

addressed." Furthermore, estimates are not provided of cumulative GHG emissions with current emissions sources in the area or reasonably foreseeable future activities that the project may facilitate by providing infrastructure.

The Applicant's estimates add up to 42.5 million tons of CO_2 equivalents over the course of mine operations and closure, which is approximately 3 percent of the entire State of Alaska's fossil fuel-related carbon emissions over the life of the project.[4] At approximately 1 million tons/year, this amount is about 50 times the total emissions from existing mining sites in Alaska (approximately 0.022 million tons/year in 2015[5]). Alaska's industrial sector already produces 57 percent of GHG emissions in Alaska; clearly the addition of this project would substantially increase that amount at a time when significant reductions in carbon emissions (e.g., 30 percent) from the oil, gas, and mining industries has been recommended by a State of Alaska task force to the Governor. [6]

The GHG emissions described here are only a small fraction of the total impact the Pebble Project would have on global carbon emissions, as they include only direct air emissions at the mine site during its period of construction, operations, and closure due to consumption of fossil fuel. However, by far the largest carbon footprint of a project such as this comes from manufacturing and transportation to the site of the materials used to construct the mine and all its associated infrastructure (e.g., building materials, concrete, pipelines). Additional carbon footprint would be created by the production and transportation of raw materials to the site, and international export and transportation of concentrate and other products offsite to the point of use. Both the carbon cost of constructing the initial mine and infrastructure and transportation of products to and from the site are greatly increased by the proposed project's remote location. A full lifecycle assessment of carbon emissions associated with the mine would be far higher than direct emissions at the site.

Climate change already directly threatens over 87 percent of Alaska Native communities.[7] Due to its higher latitude, Alaska is warming at a rate twice that of the continental United States, with impacts including flooding, glacial retreat, loss of sea ice, melting of permafrost, drought, insect infestations, and increased wildfires.[8] Many communities in Alaska are responding by working to substantially reduce climate emissions and preparing to mitigate the unavoidable impacts of

[4] U.S. Energy Information Administration (2017). https://www.eia.gov/environment/emissions/state/.
[5] Alaska Department of Environmental Conservation (2018). Alaska Greenhouse Gas Emissions Inventory 1990-2015.
[6] Climate Action for Alaska Leadership Team (2018). Climate Change Action Plan Recommendations to the Governor.
[7] Alaska Division of Geological and Geophysical Surveys, Coastal Flooding and Erosion in Alaska.
[8] U.S. Global Change Research Program (2014). National Climate Assessment.

climate change.[9] This is not the time to introduce a disproportionately large GHG emissions source in an area already facing a climate emergency, particularly for mineral products such as gold that mainly support luxury goods and are not globally or nationally in short supply.

The cumulative impacts of the proposed project and reasonably foreseeable future actions (RFFAs) are not adequately quantified or summarized.

Impacts to each element of the environment are discussed in 25 individual sections that do not adequately integrate different types of impacts on important classes of receptors, such as fisheries or subsistence practices. These resources are all connected physically and must be evaluated as interconnected elements and systems. Please see previous comments on the DEIS, which have not been meaningfully addressed [Technical Memorandum No. 3 (June 1, 2019)]. There is a newly added Section 4.1.2 comprising two paragraphs that acknowledges the interrelationships between elements of the environment, but meaningful steps to organize the document in manner that would lend itself to this integrated analysis have not been taken.

All impacts are discussed at length in individual sections but are not presented in a logical order that would allow cumulative impacts from different base stressors to be integrated with respect to key receptors or humans on the landscape scale. There is no summary section at the end of Chapter 4 or beginning of Chapter 5 that would allow the reader to gain an overview of the key impacts of the project and its alternatives, without poring through the detailed yet uninformative individual sections. All other major EISs include such a summary, and it is unrealistic to expect members of the public to navigate this document without such a summary. This summary should include pointers to where more detailed information can be found in the individual sections.

RFFAs are described in Section 4.1; however, many of these RFFAs are seldom discussed again in later sections, and there is no systematic explanation in each section of why some are considered important enough to include and others are not for any given element of the environment. Frequently, other mines are included in a general category of "Other Mineral Exploration Projects," which fails to acknowledge that some mining activities identified as RFFAs are expected to go beyond exploration to development.

Each RFFA should be systematically addressed and included in all sections. A summary section should provide a clear sense of scale in terms of the increased impacts expected from the

[9] Municipality of Anchorage (2019). Anchorage Climate Action Plan. https://www.muni.org/Departments/Mayor/AWARE/resilientanchorage/pages/climateactionplan.aspx

proposed Pebble Project buildout and all other RFFAs compared to the proposed project. In addition, it should be clarified that the Pebble Project buildout and several other mining projects are not just additional unrelated actions, but are dependent on the proposed project being built, due to the infrastructure and other components it would provide. This is a key cumulative impact of the proposed project that should be clearly described in a summary section.

Cumulative impacts of the RFFAs, as well as the key impacts of the proposed project, should be described in quantitative terms. Many of the impacts in this PFEIS are described in general terms that describe the nature of possible impacts, without providing a clear sense of temporal or spatial scale. A good example of this is the tables of impacts in the Subsistence section.

Required elements of the environmental impacts assessment are missing.

As noted in one short paragraph in Section 4.1.7, the PFEIS is required to identify and evaluate "*any adverse environmental effects that cannot be avoided should the proposal be implemented*." Unavoidable adverse impacts are further defined with a single sentence and direction to review each of the 25 sections that follow for individual elements of the environment. However, the unavoidable adverse impacts of the project are not specifically identified in any of these sections, nor is there any summary of these impacts in the PFEIS. Identification of unavoidable adverse impacts is critical because it forms the basis of required compensatory mitigation. As discussed below, the current mitigation plan put forth by the Applicant is entirely inadequate on its face. However, it further suffers from having no point of comparison or indication of what unavoidable impacts need to be compensated for.

Section 4.1.8 also notes that an EIS is required to identify and evaluate any irreversible or irretrievable commitments of resources that would be involved in the proposal should it be implemented. The section goes on to provide some definitions and overall categories of resources that could be irreversibly and irretrievably committed to the proposed project. However, these are presented only in the most general terms without specific description or quantification here or in the subsections of Chapter 4 that correspond to these bullets.

These two small sections are the only place in the PFEIS where these required elements of an EIS are discussed. These sections serve to define the terms and present an introduction to these concepts but do little more than that. Both categories of impacts are required to be not only defined, but explicitly evaluated within the document. This EIS fails to present these evaluations in any of the subsequent resource-specific sections.

Chapter 5, Mitigation, would be an obvious place to summarize the unavoidable adverse environmental impacts and irreversible or irretrievable commitments of resources that require mitigation. However, a summary of impacts is not provided, nor is there any indication of which impacts could be avoided or minimized versus those for which compensatory mitigation would be required. Instead, Chapter 5 launches immediately into a description of mitigation measures proposed by the Applicant as well as those proposed by agencies, governments, and in public comments, without any context or comparison to the identified or actual impacts. Nowhere in this chapter or anywhere else in the PFEIS is a description or clarity provided regarding what exactly requires mitigation and how well the proposed mitigation measures address these impacts.

The environmental impacts that have been identified cannot be mitigated directly or indirectly, and therefore the project should not be permitted.

In Table M-1, the USACE identifies and analyzes mitigation measures proposed by agencies, tribal representatives, and in public comments on the proposed project. Most of the measures, particularly any substantive ones, are classified as unlikely or merely possible, due the difficulty of accomplishing them and the lack of jurisdiction or enforcement authority. Those few measures to which the Applicant has committed are simple and minimal, and more oriented toward day-to-day operation than any significant compensation for the initial, ongoing, and permanent impacts that would result if the mine and infrastructure were permitted, constructed, and operated. For example, the Applicant has committed to or the USACE considers "likely" such measures as dust suppression, secondary containment for fuel and chemical storage, worker education regarding bears, implementation of an Invasive Species Management Plan, and standard erosion control measures.

More significant direction and suggestions from cooperating agencies, tribes, and public commenters were generally discounted as not being "reasonable" or lacking jurisdiction, despite being judged "effective." Examples of these more substantive measures include establishment of mitigation banks and in-lieu fee programs, designing stream crossings to avoid impacts to fish, improving liners and leachate collection systems, mitigating and compensating for impacts to subsistence resources, mitigating visual impacts of the mine, and emergency planning for foreseeable events. Many suggestions judged both reasonable and effective were nevertheless scored as merely possible or unlikely, because the Applicant has not committed to them and there is no clear way of requiring or enforcing these mitigation measures.

The Applicant simply cannot mitigate the cultural, spiritual, and health impacts to Native people and tribal communities surrounding the proposed project, since these impacts are place-based

and tied to the destruction of the specific landscape on which the proposed project, including the mine and infrastructure, would operate. The mental and physical health of members of these communities are already adversely impacted simply due to the possibility of this project becoming a reality. The actual implementation of the proposed project would pose a traumatic adverse impact on the people of these communities.

Given that thousands of acres of waters of the United States would be permanently destroyed or altered, including wetlands and important fish-bearing streams, compensatory mitigation is necessary as a condition of permitting the proposed project. However, to date the Applicant has not been able to identify any compensatory mitigation measures that could possibly offset the adverse impacts posed by the proposed project. In Table M-1, on page M-17, the USACE states, "*If the project is determined to require compensatory mitigation and the Applicant cannot provide the compensation, the application would be denied.*" It seems clear from the information provided in the PFEIS and Appendix M that both conditions exist, and the USACE should deny the permit.

Section 5.1.1 of the PFEIS states, "*all mitigation will be directly related to the impacts of the proposal, appropriate to the scope and degree of these impacts, and reasonably enforceable*." Table 5-1 further defines compensatory mitigation as "replacing or providing substitute resources or environments." Section 5.3 identifies three options for compensatory mitigation: (1) purchase credits from an approved mitigation bank, (2) purchase credits from an approved ILF program, and (3) complete permittee-responsible mitigation projects. As the first two options are not available in this instance, only the third option remains. The USACE states that "*permittee-responsible mitigation developed using a watershed approach is preferred*." However, not even this option is possible in this instance, since the proposed project would impact several watersheds that are currently wilderness areas or fully functioning ecosystems and therefore do not present opportunities for compensatory mitigation projects.

The compensatory mitigation measures proposed by the Applicant to date are far away and out of kind (e.g., culvert replacement projects in other unidentified areas of the State and shoreline debris removal), which cannot possibly compensate for the losses of specific fully functioning ecosystems, highly valued fisheries, invaluable subsistence resources, cultural landscapes and cultural resources, and fully functioning wetlands in the affected watersheds. These proposed mitigation measures are woefully inadequate and unenforceable by any state or federal agency, especially since the Applicant has not committed to identifying, funding, or carrying out any specific projects prior to receiving a permit. In addition, the magnitude of compensatory mitigation required is not achievable in this manner. Instead, the impacts would simply be un-mitigable by virtually any reasonable stretch of the imagination. The only logical conclusion is that

the project should not be permitted, because appropriate compensatory mitigation cannot be provided.

The USACE has not met the standard of government-to-government consultation required by law and policy.

The USACE is required by Executive Order 13175 and U.S. Department of Defense American Indian and Alaska Native Policy (DoD Instruction 4710.02 – DoD Interactions with Federally Recognized Tribes) to meaningfully consult with tribal governments in evaluating whether a project is in the public interest and should be permitted. Simply providing updates, teleconferences including all tribes, and general opportunities to comment does not rise to the level of required consultation, particularly when suggestions and input provided are not incorporated. Meaningful negotiations with individual tribal governments and Alaska Native Corporations are required, above and beyond consideration that would be given to the general public or state and local agencies. Consultation must occur at a level and on a timeframe that is reasonable and appropriate for tribal governments and takes into consideration traditional decision-making processes.

The USACE has largely failed to engage with the substantive comments and concerns of tribal governments most directly affected by the proposed project. Few of the previous comments provided by the Nondalton Tribal Council (NTC) during EIS scoping, review of the Preliminary Draft EIS (PDEIS), or the Draft EIS (DEIS) have been addressed. USACE and the Applicant have failed to demonstrate a reasonable understanding of the cultural, spiritual, and subsistence impacts that the proposed project would have (and is already having) on Alaska Native people and their communities and lifeways. These are not impacts that can be managed through optimizing mining and infrastructure development, best management practices, or compensatory mitigation outside the project area. At its core, the proposed project is fundamentally incompatible with the lifeways of Alaska Natives that have sustained these people for millennia in this region. If permitted, constructed, and operated, the proposed project would render much of the area unlivable from a subsistence and cultural standpoint. Even the suggestions that the NTC has made to better portray in the EIS the impacts that would occur and ways to mitigate some of those impacts have been rejected. The USACE, as a representative of the United States government, must work in partnership with tribal governments to reach a mutually acceptable outcome with respect to the proposed project.

The USACE has misleadingly presented the public comments received on the DEIS.

Over 115,000 comments were received by the USACE on the DEIS, including from tribal governments, state and federal agencies, public interest groups, chambers of commerce, businesses, and private citizens. The online database consists of 1,160 pages of comments, each of which must be scrolled through individually, and each comment on each page downloaded or viewed individually. Comments provided online cannot be downloaded at all, only viewed.

No means is provided for downloading all comments in the database or on a given page, or even viewing a complete list of commenters so that specific comments could be searched for. Substantial comments provided by important entities are mixed in with thousands of brief form letters so that they are difficult to find. The comments are not organized in any apparent way. It seems that the USACE has no intention of making it easy or even reasonably possible to access the full body of public comments on the DEIS, or to find individual comments that may be important to a viewer without having some outside knowledge of who may have commented.

In the DEIS itself, only the barest of comment summaries are provided in Appendix D, the "Comment Analysis Report," which is essentially a list of topics and general comment categories. There is no indication of who provided the comments or how many commenters supported an individual comment. Appendix D indicates that 311,885 submissions were received by the USACE, so apparently less than half of those are available to download or view online.

While at least an overview of comment topics can be obtained from reviewing Table D-1, there is no sense of scale. For example, was the comment submitted by a private citizen or a cooperating agency? Was the comment submitted by thousands or tens of thousands of individuals, or just one? Did multiple agencies agree on a position or recommendation? There is no way of knowing and no analysis of the comments, despite being titled an "Analysis Report." In a few cases, it is possible to discern the USACE's position on a comment from its response or find pointers to discussions or revisions in the PFEIS, but that is about all the value or analysis the table provides.

Of particular concern is that comments expressing support for or opposition to specific alternatives, based on a review of the DEIS, were considered "non-substantive." This is not non-substantive; it is the entire purpose of the DEIS – to support an agency's eventual decision and selection of an alternative after disclosure of its environmental impacts and potential mitigation measures. The public has a right to know how many comments were received in support of or opposition to specific alternatives and why. These comment categories are presented as if they are all equal, yet there could have been 100,000 comments in support of a particular alternative and only a few for another. A cursory review of the comments made available online makes it clear that most commenters are in favor of the No Action.

The USACE has similarly failed to address key substantive comments of State and Federal agencies, Alaska Natives, peer reviewers with substantive scientific and engineering expertise, or the public.

In most cases, the responses presented in Table D-1 do not substantively address the comments, but rather provide justification for not making changes, or reveal the barest of modifications to the EIS consisting of a wording change or a sentence or two added. Review of the PFEIS document and comparison to the DEIS finds only a few instances in which actual additional information is presented and discussed – in most cases minor modifications were made to wording or at most a paragraph added to give the appearance of acknowledging a commenter's concern.

Substantive and important comments are frequently met with "no changes were made to the EIS," particularly when additional work (field work, research, evaluation of potential impacts, etc.) would be required to fill a data gap considered critical to evaluating the potential impacts of the proposed project and its alternatives. The USACE has informed cooperating agencies that it has no intention of requiring the applicant to fill remaining data gaps or to conduct such work at this stage, lending the impression of a foregone conclusion.

The USACE permitting and EIS process has created an impression that the USACE intends to approve this project regardless of the nature and extent of adverse impacts and significant levels of concern expressed by other agencies, governments, and independent scientists and engineers who have reviewed the project. The USACE has failed to take a hard look at the proposed project and its potential impacts and has not provided sufficient information to fully disclose and evaluate the environmental impacts of the proposed project and its alternatives, much less address the substantial concerns of cooperating agencies, governments, and the public.

Conclusions and Recommendations

Based on all the above, the Nondalton Tribal Council concludes that the project is contrary to the public interest, either on its face or in light of its environmental, spiritual, cultural, and economic impacts, and should not be permitted.

Further, the Nondalton Tribal Council concludes that the USACE must deny the requested permit for the Pebble Project because compensatory mitigation cannot be provided, and is not proposed to be provided, for the thousands of acres of fisheries, streams, wetlands, and cultural and subsistence resources that would be permanently destroyed or degraded by the proposed project.

M E M O R A N D U M

DATE: March 20, 2020

Prepared By: James R. Kuipers, P.E., Principle Engineer
Bruno A. Ridolfi, P.E., Principal Engineer

SUBJECT: **PFEIS Response to Technical Memorandum No. 4 (June 1, 2019) Incomplete and Inadequate Evaluation of Potential Catastrophic Failures for Tailings Storage and other Facilities for the Proposed Pebble Project**

The Preliminary Final Environmental Impact Statement (PFEIS) includes Appendix D – Comment Analysis Report. Table D-1 includes Statements of Concern and Responses in which 39 subtopics related to tailings dam failure are identified (Appendix D, Pages 233 – 251). Our review of the PFEIS suggests that the issues and concerns raised in our Memorandum No. 4 dated June 1, 2019 submitted to the USACE by Nondalton Tribal Council are only generally identified in the subtopics. The Statement of Concern for each of these subtopics captures our comments for the most part, but does not fully capture our *recommendations*.

The responses vary considerably. While the responses include changes to the PFEIS, these changes are limited to relatively minor clarifications. Otherwise, the responses only provide additional rationale for the positions taken in the DEIS, and changes were not made in the PFEIS.

Two primary examples are provided below that directly relate to our comments on the DEIS in Technical Memorandum No. 4 and demonstrate the nature of the responses in the PFEIS.

Tailings Dam Failures – Probability of Failure

Statement of Concern: *Concerns were raised about the probability of failure of the tailings dams, during both operations and closure, and the methods used to determine that probability. Some commenters stated that the probability of dam failure increases with dam lifetime. Other commenters noted that the failure rate of tailings dams has increased in recent years.*

Response: *The probability of tailings dam failure is addressed in Section 4.27, Spill Risk. Additionally, Appendix K4.27 was added to provide more background information on the reduced*

risk of significant tailings spills from the bulk TSF compared to historic water-inundated TSFs. No further changes were made to the EIS.

An FMEA risk assessment workshop was conducted by a team of experts in dam design/ construction/operation and failures. The FMEA rated the probability and consequences of a wide range of potential failure modes during both operations and closure, based on project specific engineering design, historical data, local site conditions, etc. The final report from the FMEA provides further details (AECOM 2018l).

ADNR Alaska Dam Safety Program approval is required to "construct, enlarge, repair, alter, remove, maintain, operate or abandon" a dam. Tailings dams would all be constructed to the Class I hazard classification (highest potential hazard) and constructed with Factors of Safety of 1.9 to 2.0. The Applicant has committed to employing an ITRB in accordance with current accepted practice and ADNR guidelines (AECOM 2018k).

Based on global tailings dam failure data, the probability of tailings dam failure occurs near the end of the active mining period, when tailings dams contain the highest volume of material, including solid tailings and supernatant fluid, and are still being actively raised. After active mining ceases and no additional tailings are added to the TSFs, the rate of tailings dam failures declines. Text in Section 4.27 has been added noting the increased failure rate of tailings dams in recent years.

Tailings Dam Failures – Failure Modes and Effects Analysis (FMEA)

Statement of Concern: *Comments were received on the FMEA workshop, including the importance of risk assessment to characterize probability and consequences of tailings dam failures; objectives of the risk assessment; decisions on workshop participants; risk assessment is not possible when engineering plans are at a conceptual level only; the workshop did not consider a wide range of failure scenarios; post-closure failure of the bulk TSF was not considered; the workshop made incorrect conclusions based on limited information; the FMEA was biased due to the presence of Applicant representatives; and the FMEA process was rushed.*

Response: *The EIS-Phase Failure Modes and Effects Analysis (FMEA) workshop is described in Section 4.27, Spill Risk. The full EIS-Phase FMEA Report is provided in AECOM 2018l.*

The USACE acknowledges the importance of risk assessment for tailings dams. The EIS-Phase FMEA was conducted for EIS purposes, to select appropriate scenarios for impacts evaluation. FMEA participants were professional engineers with extensive technical experience in the mining industry.

It would not be useful or beneficial to open up such a workshop to attendees without relevant engineering expertise.

NEPA does not require advanced engineering plans to evaluate potential impacts. See also the SOC: "NEPA Process—Conceptual Design Level Only."

The FMEA addressed a wide range of failure scenarios (failure modes). Scenarios selected for analysis were those with relatively low probability and relatively high consequences. The FMEA did address the risk of bulk TSF failure in post-closure. As addressed in Section 4.27, failure rates for TSFs decline after the close of operations, when materials are no longer being added to the facilities. Failure rates for tailings in dry closure are particularly reduced compared to typical water-covered tailings ponds. Therefore, the likelihood of bulk TSF failure in post-closure was rated to be extremely low.

The conclusions drawn from the FMEA workshop were based on decades of professional experience with tailings dam construction, operations, management, etc. The information available for the workshop was appropriate for an EIS-Phase FMEA. Additional risk assessment based on more advanced engineering design level would be required prior to ADSP permitting.

It was necessary to include members of the engineering firm hired by the Applicant to provide relevant project details that may not have otherwise been available. The FMEA participants also included state regulators and third-party environmental professionals. The FMEA process allowed adequate time to meet workshop objectives.

No changes were made to the EIS.

Responsiveness to Memorandum No. 4 (June 2019) Comments

Our comments provided in the technical memorandum included the following conclusions and recommendations:

- The Ridolfi FMEA workshop participants, acting on behalf of the Nondalton Tribal Council, concluded that the Pebble FMEA workshop provided results that are biased to support a pre-determined decision not to include a full-breach analysis in the DEIS.
- The results of the Pebble FMEA are also biased in terms of underestimating both probabilities and consequences of all potential failure modes (PFMs).

- To ensure that the DEIS provides a hard look at potential consequences, the Ridolfi FMEA workshop participants, acting on behalf of the Nondalton Tribal Council (NTC) recommend that the DEIS be supplemented with information from a modified and revised FMEA derived from a workshop involving representatives of all stakeholders and well-qualified and experienced experts. Ridolfi expects that such an approach would result in a more balanced approach to assessing potential failure modes and determining which failures should be analyzed in the DEIS.

- The DEIS is incomplete, inadequate, and deficient and does not comply with NEPA requirements.

The response to previous comments on the DEIS included some minor changes in the PFEIS; however, with respect to our most substantive comments, it either repeats the original information contained in the DEIS, or provides a cursory argument that is not based on additional information or analysis to contradict our argument for substantive changes. As such, the PFEIS is largely non-responsive and our comments contained in Technical Memorandum No. 4 dated June 1, 2019. Due to the gravity of the concerns reflected in our comments, the issues in question should be discussed in more detail, given further consideration, and properly addressed prior to releasing a Final EIS (FEIS).

Concluding Comments on the PFEIS

The PFEIS fails to recognize the significant potential for a catastrophic failure associated with the Pebble Mine TSFs. The PFEIS instead relies on future more detailed analysis by the Alaska Department of Natural Resources (DNR) dam permitting process to address any shortcomings in the current TSF design that could potentially lead to a catastrophic breach. However, based on our knowledge and experience, and given site-specific aspects of the proposed design, it is both highly probable that the current TSF design will be acknowledged as having significant design flaws, and significant changes will be made to the design.

A revealing Technical Memorandum date December 13, 2019 was issued internally by a team of professional engineers and geologist at AECOM with the subject: "Pebble Project EIS – Bulk TSF Embankment Seismic Stability Analysis." This memo reveals several shortcomings in the current TSF design that considered by the PFEIS and deferred to Alaska DNR. According to the memorandum: "Several areas of uncertainty are identified that should be disclosed during the EIS process . . ." (Page 8) including the following:

- It is uncertain that thickened tailings at 55 percent solids would segregate enough to promote reduction of the phreatic surface near the bulk TSF main embankment, which translates to uncertainties regarding the effect of tailings segregation on embankment stability. Future testing and analysis committed to by PLP in RFI 008h would further the understanding of tailings deposition behavior.

- There is concern that some and perhaps all of the entire centerline part of the bulk TSF main embankment (not just the uppermost raise) could slide into potentially undrained tailings and have consequent effects in a downstream direction. Future stability analyses planned during detailed design would reduce these uncertainties, but should consider incorporating the recommendations listed below.

- The central concern is the overall main embankment and TSF stability. The critical combination of excess pore pressures and ground shaking, as well as static liquefaction without any ground shaking to induce it, either of which could result in minimum embankment stability, may occur at any time. Therefore, embankment stability must be appropriately analyzed reflecting both pore pressure buildup (strength loss) in tailings and embankment materials, under both static conditions and with continued ground motion during the duration of ground shaking based on design earthquake time history input motions.

- Potential critical pore pressures in the bulk TSF main embankment should not be "assumed away" by claiming either only a favorable (very low or deep) phreatic surface in the embankment, or such highly permeable embankment material that excess pore pressures (above hydrostatic) could not develop during earthquake loading. A relatively high phreatic surface in the downslope embankment in combination with high excess pore pressures are credible adverse conditions that must be considered as part of a long-term TSF stability analysis.

The memorandum went on to make several recommendations to mitigate these concerns in the EIS including development of an Emergency Action Plan (EAP) to address water levels in the TSF and additional stability analyses that incorporate tailings liquefaction and higher embankment pore pressures.

USACE should require that a process consistent with the current state of the art and standard of care for engineering, design, and permitting of TSFs takes place before considering the permitting of the TSFs for the Proposed Pebble Project. This prerequisite to permitting should include a

detailed design and risk analysis. This is necessary to ensure both the veracity of the EIS process and the ultimate safety of any TSF that might ultimately result from the USACE decision.

M E M O R A N D U M

DATE: March 16, 2020

PREPARED BY: James R. Kuipers, P.E., Principle Engineer
Bruno A. Ridolfi, P.E., Principal Engineer

SUBJECT: **PFEIS Response to Technical Memorandum No. 5 (July 1, 2019) Inaccurate and misleading statements of Purpose and Need in the Pebble DEIS**

The Preliminary Final Environmental Impact Statement (PFEIS) includes Appendix D—Comment Analysis Report. Table D-1 of Appendix D includes Statements of Concern and Responses in which nine subtopics of concern are identified with respect to *Chapter 1: Purpose and Need*. Notably, most if not all the nine subtopics discussed in the PFEIS are in direct response to questions and comments from our review of the Draft Environmental Impact Statement (DEIS). Most of these questions and comments were provided in Memorandum No. 5 dated July 1, 2019 that was submitted to the USACE by the Native American Rights Fund on behalf of the Nondalton Tribal Council and United Tribes of Bristol Bay. The following general and topic-specific comments are provided to describe how our previous comments on *Chapter 1: Purpose and Need* of the DEIS have been addressed in the PFEIS.

GENERAL

The nine Purpose and Need subtopics identified in the PFEIS and shown in Table D-1 of Appendix D respond either specifically or more generally to most of the substantive comments that were raised in Technical Memorandum No. 5 (July 1, 2019) titled: Key Issue 1: Inaccurate and misleading statements of Purpose and Need.

As discussed in the comments below, the responses in the PFEIS included recognition and incorporation of recommendations concerning administrative completeness and some specific, albeit mostly non-consequential changes. However, with respect to our more substantive recommendations, the responses in the PFEIS were crafted to justify statements made in the original DEIS, and the changes we recommended were not made in the PFEIS.

Response 1. Proposed Project Purpose and Need, Alternative Sources Reuse and Recycling

Subtopic: *Alternative Sources Reuse and Recycling*

Statement of Concern: *Concerns were expressed that the purpose and need for the minerals can be satisfied with far less environmental impact through other in-ground sources, through re-use and recycling of copper products and IT equipment.*

Response: *Suggested alternatives are evaluated in Appendix B of the EIS. In accordance with 33 CFR Part 325 Appendix B, the USACE has defined the purpose and need from both the Applicant's and the public's perspective. Appendix B in the FEIS has been updated to include reuse and recycling.*

Technical Memorandum No. 5 (July 1, 2019) identified the need to consider other sources and means of satisfying mineral demands other than the Proposed Pebble Project. The subtopic Statement of Concern appears to be consistent with concerns raised in our comments in the technical memorandum. The Response addresses reuse and recycling as alternative sources, and Appendix B of the FEIS has been updated to include reuse and recycling. However, the Response and changes to Appendix B do not specifically address "other in-ground sources." Instead, the PFEIS responds with: "*In accordance with 33 CFR Part 325 Appendix B, the USACE has defined the purpose and need from both the Applicant's and the public's perspective*." The PFEIS is not responsive as it does not specifically address why other in-ground sources, specifically mines in other locations were not considered as alternatives to the proposed Pebble Project in the PFEIS.

Response 2. Proposed Project Purpose and Need, Decisions to be Made

Subtopic: *Decisions to be Made*

Statement of Concern: *The Purpose and Need chapter should expand the Decisions to be Made section to describe all regulatory decisions (not just federal). The comment also stated the document needs to disclose how compliance with all authorizations will be achieved*

Response: *Section 1.3, Purpose and Need of the EIS describes the federal agencies that would use the EIS to inform their decisions, and their authorities to make permit decisions. Section 1.3 also indicates that the State of Alaska has decisions to make regarding the project. As stated in Section 1.3, the complete list of authorizations and permits that may apply to this project are listed in Appendix E. The ROD would document the three federal agencies' determinations of whether the project would comply with applicable regulations. Federal agencies make decisions based on the assumption that the permittee will comply with all permit conditions, and are empowered with*

enforcement tools to address non-compliance. No change has been made to the FEIS as a result of these comments.

Technical Memorandum No. 5 (July 1, 2019) identified the need to expand the Decisions to be Made section of the DEIS to describe all regulatory decisions and suggested that the DEIS needed to show how the USACE could ensure those decisions could be relied upon. The subtopic Statement of Concern appears to be consistent with our comments. However, as noted in the Response, no changes to the DEIS were made to incorporate these comments. Instead, the PFEIS responds that the federal agencies and authorities are adequately described, the State of Alaska permit decisions are identified, and a complete list of authorizations and permits that may apply to the project are listed in Appendix E. It also noted that:

> *The ROD would document the three federal agencies' determinations of whether the project would comply with applicable regulations. Federal agencies make decisions based on the assumption that the permittee will comply with all permit conditions and are empowered with enforcement tools to address non-compliance.*

This response incorrectly implies that federal agencies can enforce ALL permit conditions.

Response 3. Proposed Project Purpose and Need, Expand Federal Decisions to be Made

Subtopic: *Expand Federal Decisions to be Made*

Statement of Concern: *The USACE needs to revise Section 1.3 or Section 1.4 to identify independent public review processes and opportunities for comment associated with the U.S. Coast Guard (USCG) and Bureau of Safety and Environmental Enforcement (BSEE) decisions. Although USCG and BSEE might be the only other federal agencies with direct permitting authority, there are requirements for consultation with other federal agencies (e.g., natural resource trustees) and state agencies, as well as consultation with Alaska Native governments. State and local agencies also have a permitting role for the project. The USACE should revise the EIS to describe these other permitting processes and their relationship to the federal permitting process.*

Response: *Chapter 1 has been revised. Permit decisions by federal, state, and local governments are usually made independent of each other. In general, permit decisions are not dependent on another permit to be issued. One exception is that the USACE may not issue a permit under Section 404 of the Clean Water Act if the State of Alaska denies a water quality certification for the project.*

Technical Memorandum No. 5 (July 1, 2019) commented that "Section 1.3 or Section 1.4 should identify whether there are independent public review processes and opportunities for comment associated with the U.S. Coast Guard (USCG) and Bureau of Safety and Environmental Enforcement (BSEE) decisions. While these may be the only other federal agencies with direct permitting authority, there are requirements for consultation with other federal agencies (e.g., natural resource trustees) and state agencies, as well as consultation with Alaska Native governments. State and local agencies presumably have a permitting role with respect to the project. These processes and their relationship to the federal permitting process should also be described." The subtopic Statement of Concern appears to be consistent with our comments. As noted in the Response and identified in the PFEIS, most of the changes recommended by the in the technical memorandum were incorporated. However, the Response notes that:

> *Permit decisions by federal, state, and local governments are usually made independent of each other. In general, permit decisions are not dependent on another permit to be issued. One exception is that the USACE may not issue a permit under Section 404 of the Clean Water Act if the State of Alaska denies a water quality certification for the project.*

This stated lack of dependency among critical permits, including permits related to tailing storage facility safety, reclamation and closure, and financial assurance, as well as other permits that the USACE seems to be relying on in the PFEIS, is a potential fatal flaw in the overall permitting process, because it would inevitably lead to actual impacts that have been underestimated in the PFEIS. This lack of dependency should be given a hard look regarding whether it is the root cause of the NEPA EIS process inherently underestimating potential adverse impacts from mining projects.

Response 4. Proposed Project Purpose and Need, Should include Preserving Fisheries

Subtopic: *P and N should include Preserving Fisheries*

Statement of Concern: *Concerns were expressed that the USACE purpose and need should include preserving fisheries and minimizing impacts to WOUS.*

Response: *The Applicant's purpose and need statement describes a need that the Applicant has identified, and the purpose explains how the Applicant intends to meet that need. The USACE defines the overall purpose and need while generally focusing on the Applicant's statement and defining the purpose and need for the project from both the Applicant's and the public's perspective. The EIS evaluates alternatives that would meet the overall purpose, and the environmental*

consequences of each of those alternatives, including impacts to fisheries, subsistence, wetlands, and other waters. No change has been made to the FEIS purpose and need as a result of these comments.

Technical Memorandum No. 5 (July 1, 2019) commented that Bristol Bay has globally important fisheries. The Statement of Concern appears to recognize this fact as well as the importance of protecting Waters of the United States (WOUS). However, as noted in the Response, no changes to the DEIS were made as a result of these comments. Instead, the PFEIS responds that:

> *The USACE defines the overall purpose and need while generally focusing on the Applicant's statement and defining the purpose and need for the project from both the Applicant's and the public's perspective. The EIS evaluates alternatives that would meet the overall purpose, and the environmental consequences of each of those alternatives, including impacts to fisheries, subsistence, wetlands, and other waters.*

This response is not acceptable in that it does not consider the public's perspective that the purpose and need for preserving fisheries and water quality are of equal or greater importance than the production of metals. Additionally, the purpose and need for fisheries and water quality are separate from and for the most part contradictory to the production of metals from the proposed project.

Response 5. Proposed Project Purpose and Need, Too Narrowly Focused

Subtopic: *Proposed Project Purpose and Need—P and N Too Narrowly Focused*

Statement of Concern: *Concerns were expressed that the basic and overall project purpose and need (P&N) is too narrowly focused, and limits consideration of alternatives to the Applicant's preferred site.*

It was also stated that USACE's determination of the overall project purpose is silent on the agency's purpose and the public interest even though it is the agency's purpose and need for action that will determine the range of alternatives, and provide a basis for the selection of an alternative in a decision.

Currently, USACE's mandate to protect water quality is not mentioned, only one mining site is considered, and the public interest is only defined by the economic benefits of mining, not the economic benefits of preserving the area, including the economic benefits to commercial fisheries.

Commenters requested that USACE conduct an independent review of the P&N for the project from the perspective of the overall public interest, including considering if the project is economically viable, and whether there are public benefits to a project that would produce ore for the global market.

Response: *The Applicant is solely responsible for establishing the need for a project. In accordance with 33 CFR Part 325 Appendix B, the USACE will exercise independent judgement in defining the purpose and need for the project from both the Applicant's and the public's perspective. However, the USACE is not required to incorporate public interest factors in the purpose and need. In addition, the USACE is neither an opponent nor a proponent of any project, therefore the agency's purpose should not be a part of the purpose and need.*

The purpose and need must not be unreasonably narrow so as to preclude consideration of a reasonable range of alternatives. The purpose and need was expanded from the Applicant's proposed purpose and need. This expansion allowed for the consideration of additional alternatives. The full range of alternatives considered is described in Appendix B of the EIS. Of this range of alternatives, four alternatives are reasonable, and therefore are considered in detail in the EIS.

In accordance with 33 CFR Part 320.4, as part of the public interest determination, which is documented in the ROD, the USACE will make a determination regarding the need for the project from the perspective of the public interest, including an evaluation of the economic benefits and detriments of the activities under USACE authority.

Technical Memorandum No. 5 (July 1, 2019) commented that the Pebble Project is highly speculative and provided a financial evaluation (Attachment 5A, May 1, 2019) in support of the comments. The Statement of Concern reflects this comment as well as comments provided by others related to the economic benefits of mining versus the economic benefits of fisheries and other public benefits. The Response in the PFEIS includes the following notable excerpts:

> *However, the USACE is not required to incorporate public interest factors in the purpose and need. In addition, the USACE is neither an opponent nor a proponent of any project, therefore the agency's purpose should not be a part of the purpose and need.*
>
> *In accordance with 33 CFR Part 320.4, as part of the public interest determination, which is documented in the ROD, the USACE will make a determination regarding the need for the project from the perspective of the public interest, including an*

evaluation of the economic benefits and detriments of the activities under USACE authority.

This response basically justifies the approach taken in the DEIS. This position taken by the USACE should be reviewed in its entirety for consistency with regulatory requirements.

Response 6. Proposed Project Purpose and Need, Project Background

Subtopic: *Proposed Project Purpose and Need—Project Background*

Statement of Concern: *EIS Chapter 1, Purpose and Need, should describe the project background, including a general description of the project area, Pebble deposit discovery, exploration, previous development proposals, EPA involvement, information about the Applicant, including their mining credentials/history, and the USACE completeness review of PLP's application.*

Response: *Chapter 1 of the EIS was revised to add project location information and confirm that the application was determined to be complete. Information on the project's proposed production is described in Chapter 2. Information on the Pebble deposit discovery, exploration, previous development proposals, EPA involvement, or information about the Applicant, including their mining credentials/history, is not relevant to the NEPA analysis.*

Technical Memorandum No. 5 (July 1, 2019) commented that the background section should provide a general description of the proposed project area including its location related to major towns and cities, watersheds, areas of special interest (e.g. national parks, wilderness areas, state parks), and a concise description of the project's proposed production. The section should include information about the original project discovery and the various developments that have occurred prior to the application for a permit that initiated this EIS. This should include discussion about previous project proposals as well as associated evaluations by EPA and other regulatory agencies concerning the proposal for mining of the Pebble deposit. It should also include information about the project proponent including their history and address their capacity, such as whether they are an existing reputable mining company with currently active mining operations, or whether this would be their first and only operation. This section should also disclose to what extent, if any, a completeness review was conducted on the proponent's application for a permit, prior to initiation of the NEPA process.

The subtopic Statement of Concern appears to be consistent our comments. The response notes that *Chapter 1 of the EIS was revised to add project location information and confirm that the*

application was determined to be complete. Information on the project's proposed production is described in Chapter 2; however, the PFEIS goes on to say that:

> *Information on the Pebble deposit discovery, exploration, previous development proposals, EPA involvement, or information about the Applicant, including their mining credentials/history, is not relevant to the NEPA analysis.*

We disagree with this assertion. Previous development proposals are needed to inform alternatives and cumulative impacts. EPA involvement related to the Watershed Assessment is vitally important and should have been given appropriate consideration in this EIS. Information as to the Applicant's credentials, history, and experience is critical with respect to the probability that the project would actually be constructed, operated, closed, and reclaimed as described in the EIS. This probability of proper mine development and management is an essential factor in evaluating the risks and potential impacts of the proposed project.

Response 7. Proposed Project Purpose and Need, Project not needed in Alaska or US

Subtopic: *Proposed Project Purpose and Need—Project not needed in AK or US*

Statement of Concern: *Concerns were expressed that USACE's overall purpose is to develop and operate a mine in Alaska, but the Purpose and Need section does not demonstrate a need for the project to be located in Alaska or the United States. The Purpose and Need section should address the Executive Order on critical minerals; comments were received that copper, gold, and molybdenum are not designated critical minerals, while other comments noted that rhenium is.*

Response: *The Applicant is solely responsible for establishing the need for a project. In accordance with 33 CFR Part 325 Appendix B, the USACE will exercise independent judgement in defining the purpose and need for the project from both the Applicant's and the public's perspective. Also, in accordance with 33 CFR Part 320.4(q), as part of the public interest determination, which is documented in the ROD, the USACE may make a determination regarding the need for the project from the perspective of the public interest.*

The Applicant's stated purpose does not preclude the mining of minerals identified in Executive Order 13817 (2017) on critical minerals. In addition, the mining of minerals not included in the Executive Order is not prohibited.

Technical Memorandum No. 5 (July 1, 2019) commented that this section demonstrates neither a need for the project in Alaska nor a need in the United States. The DEIS should have noted that

the primary commodities to be produced by the project, copper, gold, and molybdenum, are not considered by the United States to be "critical minerals." The subtopic Statement of Concern appears to be consistent with our comments. The PFEIS responds by saying:

> *The Applicant is solely responsible for establishing the need for a project* and *the USACE will exercise independent judgement in defining the purpose and need for the project from both the Applicant's and the public's perspective* and *as part of the public interest determination, which is documented in the ROD, the USACE may make a determination regarding the need for the project from the perspective of the public interest.*

Essentially what this means is that we will need to wait until the ROD to see how the USACE addresses this concern, the purpose and need of the proposed project, and any other aspects it considers to be "from the perspective of public interest." The USACE's view on this matter does not reconcile with the continuous participation of the Nondalton Tribal Council (NTC) and other cooperating agencies in the NEPA process that is based in large part on ensuring that the perspective of public interest was addressed in the EIS process.

Response 8. Proposed Project Purpose and Need, Concerns

Subtopic: *Proposed Project Purpose and Need—Purpose and Need concerns*

Statement of Concern: *Concerns were expressed during scoping regarding the USACE Purpose and Need for the project and its relationship to selection of alternatives*.

Response: *The Purpose and Need is described in Chapter 1 of the EIS and the alternatives are described in Chapter 2, Alternatives. No change has been made to the FEIS as a result of these comments.*

Technical Memorandum No. 5 (July 1, 2019) commented the USACE is supposed to develop a range of alternatives to address major issues. The subtopic Statement of Concern appears to be consistent with our comments, although it identified the comment from "*during scoping*." As noted in the Response, no changes to the DEIS were made as a result of these comments. Instead, the PFEIS responds that: *The Purpose and Need is described in Chapter 1 of the EIS and the alternatives are described in Chapter 2*. Our response to the information provided in the PFEIS regarding alternatives is provided in Technical Memorandum No. 1: Incomplete and Inadequate Development and Analysis of Alternatives (March 2020).

Response 9. Proposed Project Purpose and Need, Significant Issues

Subtopic: *Proposed Project Purpose and Need—Significant Issues*

Statement of Concern: *The EIS Chapter 1 should identify the significant issues of the project.*

Response: *Section 4.1.2 lists the issues that were selected for analysis in the EIS. These issues were identified through the scoping process. In addition, the Executive Summary summarizes the issues and analysis identified for inclusion in the EIS. No changes were made to the EIS.*

Technical Memorandum No. 5 (July 1, 2019) commented that the significant issues based on public, tribal, and agency comments made during the scoping process should be summarized in this section. The summary for each issue should describe the measures to be used to assess each of the issues across alternatives at the end of each item. The subtopic Statement of Concerns only recognizes our comments generally and partially suggesting that: *The EIS Chapter 1 should identify the significant issues of the project.*

However, as noted in the Response, no changes to the DEIS were made as a result of these comments. Instead, the PFEIS responds that:

> *Section 4.1.2 lists the issues that were selected for analysis in the EIS. These issues were identified through the scoping process. In addition, the Executive Summary summarizes the issues and analysis identified for inclusion in the EIS.*

This statement is not accurate and is nonresponsive with respect to important issues that were included in the scoping process but were excluded from the DEIS and the PFEIS.

M E M O R A N D U M

DATE: March 16, 2020

PREPARED BY: James R. Kuipers, P.E., Principle Engineer
Bruno A. Ridolfi, P.E., Principal Engineer

SUBJECT: **PFEIS Response to Technical Memorandum No. 6 (July 1, 2019) Reclamation and Closure Plan and Preliminary Financial Assurance Cost Estimate for the Proposed Pebble Project**

The Pebble Project Preliminary Final Environmental Impact Statement (PFEIS) Statements of Concern and Responses identified three subtopics related to reclamation and restoration (Appendix D, Pages 181 and 182) and five subtopics related to bonding or financial assurance (Appendix D, Pages 16 through 21).

Reclamation and Restoration

Technical Memorandum No. 6 submitted to USACE on July 1, 2019, provided the following summary of our extensive comments regarding the lack of a detailed reclamation and closure plan in the Draft Environmental Impact Statement (DEIS):

> The lack of a detailed reclamation and closure plan is a critical data gap in the DEIS. Without this information, which has typically been provided for similar NEPA analyses, the DEIS does not provide adequate context for assessment of impacts to wetlands, Waters of the United States (WOUS), or other impacts, including to wildlife, fish and aquatic resources, subsistence resources, and other human uses and activities, as it fails to provide specific reclamation and closure information necessary to develop a science-based finding as to post-mining impacts or mitigation. Given the critical need for this information, USACE should require that the applicant provide a detailed reclamation and closure plan consistent with regulatory requirements as noted in further comments herein. The USACE should revise this DEIS to include the reclamation and closure plan, provide cooperating agencies with an opportunity to review and comment, and re-issue the revised DEIS for public review and comment.

The Statement of Concern and Responses (Pages 181 and 182) includes one reclamation and restoration subtopic specifically on the Reclamation and Closure Plan with the following statement of concern: *Concerns were expressed that the DEIS did not include a detailed reclamation and closure plan*. The response is as follows:

> *PLP has provided a reasonably detailed Reclamation and Closure Plan to help inform the impact analysis for the FEIS (PLP 2019-RFI 115). The purpose of PLP's Reclamation and Closure Plan is to provide guidelines for implementing stabilization and reclamation procedures for the various facilities associated with the project. These guidelines are based on the best available reclamation technologies and on state regulations for mine reclamation. PLP's Reclamation and Closure Plan has been summarized in Chapter 2, Alternatives, and incorporated into impact analyses in Chapter 4 of the FEIS where appropriate. An approved reclamation plan is required by the state mining regulations (11 AAC 97.300 through 97.350), and the reclamation plan does not become effective until a performance bond is in place, except for certain small operations.*

The inclusion of a more detailed Reclamation and Closure Plan (RCP) at least in part addresses our comments in Memorandum No. 6. It is notable the PLP retained SRK Consulting (SRK) to prepare the RCP. SRK is highly experienced with respect to both industry practice and compliance with regulations of the Alaska Department of Natural Resources (ADNR). SRK was recently involved in the RCP developed for the Donlin Gold Project EIS and state permitting process in Alaska.

The increased level of detail the RCP provided is consistent with our expectations for what should have been relied upon and included in the DEIS. The substance of the plan, however, is not consistent with our expectations. As it was a clear data gap in the DEIS, we continue to advocate for a Revised DEIS that includes the new RCP. A Revised DEIS including the new RCP information should then be provided for public review and comment prior to preparing the FEIS.

Financial Assurance

The July 1, 2019 Memorandum No. 6 provided the following comments on financial assurance:

> The proposed Pebble Project includes measures and controls that would require long-term post-closure operations and maintenance (O&M) to protect water quality. The need for long-term post-closure O&M, facilities replacement, and monitoring should be acknowledged in the DEIS. The DEIS should contain

> adequate details regarding financial assurance commitments (e.g., for reclamation and long-term O&M) as well as meaningful assurances that a proper financial instrument will be established to ensure that adequate funds are available as long as they may be needed for this purpose.

The Statement of Concern and Responses (Pages 19 and 20) includes one reclamation and restoration subtopic specifically on the need for details regarding financial assurance commitments. The subtopic statement of concern was as follows:

> *Commenters stated that the EIS should include a financial surety estimate to enable evaluation of the adequacy of financial assurance, given the need for long-term water treatment. Specific suggestions for the amount that should be required were provided.*

The PFEIS response cites the Alaska ADNR and Alaska Department of Environmental Conservation (ADEC) regulations and requirements for financial assurance and attempts to justify the lack of financial assurance information in the PFEIS as follows:

> *Under these circumstances, where an estimated bonding amount is not available, the NEPA review analyzes effects under the assumption that state permitting requirements are complied with. The ADNR would work with PLP at the appropriate time to ensure PLP submits a complete Reclamation and Closure Plan, including cost estimates, sufficient for review under applicable state statutes and regulations. The estimated financial assurance costs would be subject to a public review period during the state permitting process. This would be the opportunity for the public to comment on the detailed information that would be part of the calculation for funding amounts for long-term post closure costs.*

As a comment on this response, we would first note that we did provide a reasonably detailed and professionally estimated reclamation bonding amount in our July 1, 2019, Technical Memorandum No. 6 based on the conceptual designs and limited RCP information provided in the DEIS. This information was not provided in the PFEIS. However, more relevant to the response, SRK can relatively easily develop a financial assurance estimate using their Standard Reclamation Cost Estimation (SRCE) model and has done so in many cases for clients prior to or during the NEPA process for consideration by the proponent as well as the permitting agencies and cooperating agencies. Including a financial assurance estimate and commitments in this EIS is not an unreasonable request. This information provides important facts needed to evaluate both

potential impacts and mitigation measures and relieves the USACE from otherwise relying upon "assumptions."

We are very familiar with the ADNR and ADEC processes for developing financial assurance commitments including the public review and input process. The public is only given the opportunity to review this information following what is typically a substantive negotiation process between the proponent and the agencies. What is presented is essentially an already agreed upon outcome and as a result; therefore, actual consideration of this information, much less responses to input from cooperating agencies and the public is not actually allowed.

As it was a clear data gap in the DEIS, we continue to advocate for a Revised DEIS that includes the reclamation bond estimate and financial assurance information. A Revised DEIS including this financial information should then be provided for public review and comment prior to preparing a FEIS.

MEMORANDUM

DATE: March 18, 2020

PREPARED BY: Sherrie Duncan, Principal Fish Biologist/Restoration Ecologist

SUBJECT: **PFEIS Response to Technical Memorandum No. 7 (July 1, 2019) Preliminary Final Environmental Impact Statement: Incomplete and Inadequate Evaluation of Watershed Health and Function and Aquatic and Terrestrial Resources**

This memorandum provides high-level comments on the Preliminary Final Environmental Impact Statement (PFEIS) for the Proposed Pebble Project that was released by the U.S. Army Corps of Engineers (USACE) to Cooperating Agencies for review on February 6, 2020. The PFEIS was developed with edits to the Draft Environmental Impact Statement (DEIS) dated February 22, 2019. The short time frame for this review provided inadequate time to do a thorough review and gain a full understanding of the PFEIS, the thousands of pages of supporting documents, and close to 116,000 Public Comments on the Pebble Project EIS Portal, many of which were uploaded in recent months. Additionally, groundwater, air quality, and fugitive dust models were recently revised, updated with new data, or completely replaced with new models. Wetlands and vegetation were remapped using supplemental data. Sufficient time was not given for critical review of these models and remapping efforts. Lack of adequate time for review of the new body of technical information became clear through comments and discussions from the Cooperating Agency representatives during the Cooperating Agency Technical Meetings facilitated by USACE in Anchorage, Alaska from March 9 through 11, 2020.

The Proposed Pebble Project is very large in scope and would affect vast area, most of which is pristine and fully functioning ecosystem. The potential impacts from the proposed project are extraordinarily adverse to the Bristol Bay region.

The PFEIS has not been significantly altered from the DEIS, which was neither sufficiently complete to enable a sound permit decision nor sufficiently clear for reviewers to fully understand the proposed project and make informed comments and recommendations.

The health and function of a watershed not only affects aquatic and terrestrial resources. It also affects the health of Alaska Native communities in the region and the function of lifeways and cultures through reduction of fish and wildlife populations and bioaccumulation and

biomagnification of mercury and other contaminants in fish and wildlife tissues. As written, the PFEIS does not address the previously submitted comments to the DEIS, it continues to parse out, separate, and minimize the ecological issues, and the PFEIS does not recognize that the ecological health and function of the pristine and wild ecosystems of Bristol Bay and Cook Inlet Watersheds are directly related to the survival of Alaska Native people, sovereign governments, and communities.

A project of this magnitude is likely to adversely impact salmon and other fish at the individual and population level by reducing the abundance, productivity, spatial structure, and diversity of each species, thus reducing the viability of populations. Roads and associated infrastructure are one of the top causes of the impending collapse of wild salmon populations in the lower 48 states, and the billions of dollars spent attempting to retrofit structures and restore habitat has failed to recover wild salmon populations. The proposed project will also impact the presence, habitat use, and migratory corridors of wildlife populations including the famous McNeil River and Katmai brown bear populations, Iliamna harbor seals that live in and rely solely on the waters of Iliamna Lake for their entire lives, and caribou that have particular cultural significance for the Alaska Native people in the region.

With few roads, minimal development, and minimal contamination, the Bristol Bay region is unique as one of the most wild, intact, pristine, and naturally functioning areas in the world. Impacts to these unique watersheds will reverberate far beyond watersheds and receiving waters and could impact the existing economic engine that supports businesses, livelihoods, and ways of life in Alaska, the lower 48 states, and throughout the world.

The fisheries of Bristol Bay are globally important. Approximately 42 percent of the world's harvest of wild salmon and 80 percent of the production of high-value wild salmon species such as sockeye, king, and coho salmon, come from Alaska waters. All five species of Pacific salmon return to Bristol Bay to spawn in its rivers, including pink, chum, sockeye, coho and king. The waters of the region have long been an integral part of the state and local economies, providing thousands of sustainable jobs to Alaskans for generations. Commercial fishing-related jobs account for nearly 75 percent of local employment.

The PFEIS continues to piecemeal the Proposed Pebble Project and the evaluation of potential impacts, and it provides no comprehensive analysis of cumulative effects. NEPA prohibits breaking apart large projects into smaller pieces for a piecemeal evaluation of potential environmental impacts. The full buildout of the proposed project, including the expansion scenario (which is not just a scenario, but rather it is the ultimate intent of the proposed project), reclamation, closure, and post-closure phases (long-term and in perpetuity) must be analyzed as one project under one

NEPA review process. Furthermore, areas downstream and outside of the mine and infrastructure footprints must be thoroughly analyzed to identify impacts to the unique ecosystems of Bristol Bay and Cook Inlet Watersheds. For example, the PFEIS states different footprint areas for cumulative effects and impacts for the expansion scenario between Section 4.22 Wetlands and 4.24 Fish Values as they relate to specific project and infrastructure footprint areas in the two habitats. This approach is misleading and inadequate for analyzing the impacts to aquatic and terrestrial resources and further confuses the understanding of the potential impacts of the whole project.

Additionally, multiple stream crossings in the form of culverts will remain indefinitely on the landscape, and there's no mention in the PFEIS of the long-term and permanent impacts and cumulative effects due to probable lack of maintenance or complete failures over time. Also, it is not clear if the culverts and bridges would be designed to pass 100-year flow and associated debris and how those flows and associated debris will change due to climate change.

After reviewing Appendix D: Comment Analysis Report and Comment Response Matrices for individual agencies, it is apparent that the majority of submitted comments were not addressed, and no changes to the PFEIS document were made to address those comments. For example, the Nondalton Tribal Council (NTC) Comment Response Matrix includes 428 comments and 267 of those comments have one of the following responses:

- Comment noted. No change to document is proposed.
- Comment noted. No change to document needed in response to this comment.
- Comment noted. Requested change is beyond the scope of this NEPA analysis. No change to document.
- Comment noted. Requested change would require detailed analysis of elements outside of federal authority. No change to document.

Not addressing comments related to serious concerns, such as requesting additional analysis on a tailings dam failure that would result in severe and catastrophic impacts to the existing pristine and functioning habitats across the watersheds, is not acceptable. While the NTC Comment Response Matrix implies that 161 of the 428 comments were addressed through some editing of the document, it is impossible to efficiently and adequately review the edits because a redlined/tracked changes version was not provided. Those edits that could be identified provided minimal additional information.

Furthermore, it appears that the document was edited to reduce the original narrative regarding impacts to resources such as stream habitat. For example, conducting a word search on the Section 4.24 Fish Values, the DEIS included the word "mile" 42 times when discussing stream miles of fish habitat. The PFEIS uses the word "mile" five times when discussing stream miles of fish habitat. Similarly, the discussion of resident fish habitat and anadromous fish habitat seems to be reduced in the PFEIS. The discussion goes on to tell the reader that the loss of habitat is not expected to have a measurable impact on fish populations downstream of the mine site because "these narrow, steep, higher gradient streams have lower habitat values and low fish densities compared to downstream reaches." This statement wrongly diminishes the importance of these types of habitats. Ecosystems function through connectivity of processes and habitat. Highly functioning watersheds rely on all habitat types and processes from headwaters to ocean.

If permitted, constructed, and operated, the proposed project would leave a large, permanent footprint on the region with impacts across seven watersheds. This footprint from direct and indirect impacts cannot be reduced to a few miles of a few selected streams where construction will occur. Additionally, simply discharging treated effluent to downstream areas will not enhance those habitats that were once pristine and naturally functioning with unique water quality characteristics that anadromous and resident fish species rely on. Once these unique water quality characteristics are lost, the fish will be adversely impacted or lost completely.

Like the DEIS, the PFEIS process was rushed, resulting in another incomplete document that fails to acknowledge and conduct an analysis of the full buildout of the entire mine and associated infrastructure. Consequently, the PFEIS does not provide a robust analysis or quantification of cumulative impacts, including synergistic effects. The PFEIS is relying on conceptual designs to analyze an intricate, large-scale mining project of unprecedented mine size, extensive infrastructure, and massive tailings dams. The PFEIS neglects to consider the full scope and long-lasting irreversible and potentially catastrophic environmental consequences of a tailings dam failure, long-term releases of contaminated wastes, and imposing infrastructure being on the landscape in perpetuity.

The PFEIS continues to be incomplete with numerous data gaps that make it impossible to adequately evaluate the environmental impacts of the proposed project to the extent necessary and to apprise and inform decision makers and the public of the full breadth of these impacts as necessary to identify the Least Environmentally Damaging Practicable Alternative (LEDPA), which in this watershed should be the No Action Alternative.

One major data gap that remains is the identification of all waters with anadromous or resident fish. The PFEIS continues to rely on an old and incomplete data set that includes only a few days

of observation in a few places. Fish move widely and far, occupying different habitats within a watershed from year to year. Therefore, looking at a stream one time on one day is not enough to determine if that stream is used by fish.

The Clean Water Act directs the USACE to issue discharge permits only if (1) no significant degradation will occur, (2) there is no practicable alternative which would have less adverse impacts, and (3) all appropriate and practicable measures to minimize harm have been included. The PFEIS does not include a reasonable range of alternatives for consideration. The PFEIS includes only three similar alternatives with variations in the transportation corridors, and it includes no considerations of alternative locations or less impactful alternatives.

Alarmingly, the proposed project exceeds the criteria set forth in the 2014 USEPA Bristol Bay Watershed Assessment and proposed determination for unacceptable adverse effects resulting in the complete loss of documented salmon streams, tributaries, and wetlands due to disposal of dredged or fill materials into Waters of the United States to develop the mine pit, construct tailings impoundments, and store waste rock piles. In addition, water withdrawal and capture, water storage, water treatment, and release of wastewater associated with the proposed mine would significantly impair the fish habitat functions of other streams, wetlands, ponds, lakes, and aquatic resources through elimination, dewatering, and fragmentation. These losses would be irreversible and irretrievable. This was the finding of the Watershed Assessment, and it didn't take into consideration potential impacts from related development, operation, and maintenance of supporting infrastructure, contamination from spills, alteration of streamflow and groundwater from withdrawal, storage, treatment, and wastewater discharge that combined would significantly impair watershed and fish habitat functions in other streams, tributaries, wetlands and aquatic habitats throughout the Bristol Bay watershed.

The PFEIS relies on future permitting efforts to provide critical system designs, management plans, monitoring plans, and other information needed to properly evaluate potential impacts in this EIS. Many of these designs and plans are important for understanding the mitigation measures and monitoring efforts intended to protect the environment from the proposed project. The missing or inadequate plans include but are not limited to: Dust Control Plan; Wildlife Management Plan; Aquatic Resource Monitoring Plan; Cultural Management Plan; Stormwater Management Plan; Erosion Management Plan; and Groundwater Monitoring Plan. This approach leaves the public and decision makers lacking necessary information to truly understand the social and environmental impacts from the proposed project.

One plan that was available for review was the Draft or Final Compensatory Mitigation Plan (CMP) which was drastically insufficient as it includes no compensatory mitigation in the area of impact

due to the project footprint remaining in place in perpetuity, and the watershed being so remote, pristine, and lacking of areas for restoration. Instead, the CMP recommends fixing a few culverts in already impacted watersheds, updating existing water treatment plants and picking up debris and garbage on beaches. None of this suggested mitigation would begin to offset the damage to the ecosystem and loss of the functions and services it provides to the aquatic and terrestrial species and humans in the affected area and beyond. It is preposterous to allow a private foreign company to destroy a wild pristine functioning watershed and require no real compensatory mitigation. Therefore, the least environmentally damaging practicable alternative in this case is the No Action Alternative, and the USACE should deny the permit application without prejudice.

The PFEIS has not been revised to the extent necessary to address the three Key Issues below that were identified during the review of the DEIS and submitted to the USACE in Technical Memorandum No. 7 dated July 1, 2019.

Key Issue 1: **Inadequate recognition of current watershed health, function, and value and the inability to restore the watershed ecosystems once damaged (PFEIS Sections 3.1, 3.6, 3.9, and 3.22 through 3.26)**

The watersheds and fully functioning natural ecosystems within the areas affected by the proposed project are irreplaceable and cannot be restored once damaged by construction and operation of a large-scale metal mine and associated infrastructure. No viable alternatives for mitigation (avoidance, minimization, compensation) or restoration have been identified.

Restoring damaged areas is virtually impossible, since restoration has never been done on this expansive scale, and there are few areas within the watersheds affected by the proposed project that are currently in need of restoration. Hence, the applicant will find it impossible to implement compensatory mitigation projects with sufficient functional lift to achieve replacement requirements. The valuable natural and cultural resources in the areas affected by the proposed project will be sacrificed and lost if the Proposed Pebble Project is permitted and constructed. "Out-of-kind" mitigation is NOT recommended, it will NOT replace lost aquatic functions, and will lead to the irretrievable loss of salmon and the ecosystem.

Mitigation or restoration on this scale has never been attempted. Re-creating a functioning watershed is virtually impossible. Humans cannot improve intact natural ecosystems. Removing streams, tributaries, wetlands, and ponds from a watershed for over 25 years will result in loss of natural process and function and will adversely impact inputs to downstream areas by such mechanisms and effects as sediment transport, loss of interstitial spaces due to lack of sediment transport, compaction of substrates, addition of detritus and nutrients, changes to water chemistry, loss of macroinvertebrates, loss of prey, changes in high and low flow regimes,

groundwater upwelling, aquifer recharge, changes in hyporheic function, changes in hydrological and geomorphological processes and function, changes in temperature regimes, changes in physical and biological processes, loss of riparian and terrestrial habitat, changes in soil ecology, etc.

Key Issue 2: **Inadequate evaluation of potential impacts to water, fish, and aquatic resources, especially salmon (PFEIS Sections (Sections 4.1, 4.6, 4.9, and 4.22 through 4.26)**

- The invaluable salmon resource and the ecosystem on which the salmon rely for survival are irreplaceable. If permitted and constructed, the Proposed Pebble Project will substantially damage or destroy this fully functioning natural ecosystem and cause a substantial economic loss to local, state, national, and world markets.

- A thorough and comprehensive evaluation of potential impacts to water, fish, and aquatic resources, especially salmon, is needed to comply with the National Environmental Policy Act (NEPA) and support a properly informed permitting decision.

- A more accurate and comprehensive evaluation of the risks to aquatic resources including a catastrophic tailings dam failure is needed. As with the DEIS, the PFEIS continues to address risks to streams mainly with respect to temporary water quality effects and risks to fish only during the time of a spill or release event. There is little to no discussion of the effects on other aquatic life, sediment contamination, and permanent changes to habitat that would impact fish and other aquatic life in the aftermath of a spill or release. Incorrect assumptions were made regarding the ability of metals in tailings to be released to overlying water based on geochemistry. The ability of metals to impact the food chain through ingestion was entirely ignored.

- As with the DEIS, the Spill Risk section of the PFEIS included several comments in passing about the mine operator removing tailings from streams; this would be virtually impossible given the rocky substrate, the fine-grained particle size of the tailings, and the remote wilderness environment. Should tailings removal from remote streams be attempted, it might do more harm than good to habitat. Realistic assessments need to be included in the PFEIS recognizing the permanence of tailings in streams and the associated habitat alteration, damage, and loss after a spill or release.

Key Issue 3: **Inadequate evaluation of potential impacts to wildlife, migratory routes, and threatened and endangered species (PFEIS Sections 4.1, 4.6, 4.9, and 4.22 through 4.26)**

- As with the DEIS, the sections of the PFEIS on Wetlands, Wildlife, Fish, and Vegetation provide an incomplete, inadequate, and narrow discussion for a project of this size that spans an expansive landscape encompassing several watersheds. If permitted, constructed, and operated, the proposed project would adversely impact several aquatic and terrestrial species in Bristol Bay and Cook Inlet.

- The proposed project would require the complete removal of intact, fully functioning streams, tributaries, wetlands, and ponds. This pristine, wild, and fully functioning natural ecosystem would be altered, discharged into, dredged, and filled for over 25 years. This intensive disturbance would result in removal of an interconnected ecosystem and loss of the biodiversity and functional habitat and services provided to the watersheds on which aquatic and terrestrial resources rely.

- Mitigation or restoration on this scale has never been attempted. Re-creating a functioning watershed is virtually impossible. Humans cannot improve intact natural ecosystems. Removing streams, tributaries, wetlands, and ponds from a watershed for over 25 years will result in loss of natural process and function and will adversely impact inputs to downstream areas by such mechanisms and effects as sediment transport, loss of interstitial spaces due to lack of sediment transport, compaction of substrates, addition of detritus and nutrients, changes to water chemistry, loss of macroinvertebrates, loss of prey, changes in high and low flow regimes, groundwater upwelling, aquifer recharge, changes in hyporheic function, changes in hydrological and geomorphological processes and function, changes in temperature regimes, changes in physical and biological processes, loss of riparian and terrestrial habitat, and changes in soil ecology.

- Statements and conclusions regarding the effects of the proposed project on brown bear migratory routes are incomplete and inadequate. The proposed transportation routes will adversely impact brown bears and the ecotourism industry in McNeil River State Wildlife Sanctuary and Refuge, Katmai National Park, and other valuable wildlife areas.

- The plans for transportation and shipping across watersheds and in areas that are not navigable due to high winds, extreme tides, and shallow rocky water need to be thoroughly vetted with the U.S. Coast Guard, local vessel captains and vessel owners, and other knowledgeable individuals.

- As with the DEIS, the evaluation in the PFEIS of potential impacts to threatened and endangered species is incomplete and inadequate. The Threatened and Endangered

Species (TES) sections provide incomplete and narrow discussions for a project of this size that spans an expansive landscape encompassing several watersheds. If permitted, constructed, and operated, the proposed project would impact several aquatic and terrestrial species on which TES and State of Alaska Special Status Species in Bristol Bay and Cook Inlet rely for survival.

The recommendations below were provided to the USACE in technical memoranda dated July 1, 2019. None of these recommendations were accepted and incorporated into the PFEIS. This PFEIS should be revised and released to cooperating agencies and the public as a Revised Draft EIS (RDEIS). This would afford the cooperating agencies, the people affected by the proposed project, and the public an opportunity to review and take into account all the information that has been added to the PFEIS since the DEIS was reviewed.

- The DEIS must be revised to evaluate the additional build out as it is a reasonably foreseeable future condition under NEPA.

- The DEIS must be revised to establish an adequate economic analysis of the loss of salmon to the local, regional, state, national, and world economy.

- The DEIS must be revised with an expanded analysis area to thoroughly evaluate and take a hard look at impacts related to the proposed mine and supporting infrastructure at a watershed and landscape scale.

- The DEIS must be revised with an expanded analysis area to thoroughly evaluate and take a hard look at impacts in order to provide a comprehensive evaluation of the impacts to all life histories across genetically distinct populations of salmon and other fish and their use of habitat throughout the watersheds.

- The DEIS must be revised to thoroughly evaluate and take a hard look at impacts related to the roads, pipelines, culvert, bridges, and supporting infrastructure at a watershed and landscape scale.

- The DEIS must be revised to thoroughly evaluate and take a hard look at impacts to water quality from fugitive dust, spills, leaks, and discharge of treated wastewater to ensure water quality standards meet state and federal requirements.

- The DEIS must be revised to thoroughly evaluate and take a hard look at impacts to aquatic and wildlife resources from all contaminants to understand concentrations, toxicity, bioaccumulation and biomagnification of mercury and other contaminants in fish and wildlife.

- The DEIS must be revised to thoroughly evaluate and take a hard look at impacts to aquatic resources from all contaminants, including mercury, copper, and other toxic metals, to ensure fish and wildlife are safe to eat.

- The DEIS must be revised to thoroughly evaluate and take a hard look at impacts related to a massive or catastrophic dam failure at a watershed and landscape scale.

- The DEIS must be revised to establish an adequate baseline for existing environmental conditions including conducting studies to thoroughly inventory anadromous waterbodies and update the Anadromous Water Catalog (AWC) to ensure all waters supporting salmonids are afforded protections under AS 16.05.871.

- The DEIS must be revised to provide a thorough, robust, and comprehensive analysis of cumulative effects, including synergistic effects to fish, wildlife, and the habitats they rely on.

Overarching Recommendations to DEIS not addressed in PFEIS

- To appropriately evaluate the impacts resulting from destruction of this interconnected ecosystem and complete loss of the biodiverse and functional habitat and services provided to freshwater, estuarine, and marine aquatic and terrestrial resources, ecological studies must be conducted at the watershed and landscape level.

- The PFEIS should be completely revised and released to the public for review. This Revised Draft EIS (RDEIS) should include and be informed by adequate baseline studies completed to facilitate appropriate evaluation of short-term and long-term direct, indirect, and cumulative impacts, including synergistic effects, that will result in irreversible damage and irretrievable commitments of aquatic and terrestrial resources in Bristol Bay and Cook Inlet watersheds.

- The RDEIS should be reissued to cooperating agencies and the public, and an appropriate amount of time should be allowed for the cooperating agencies and the public to review and comment on the RDEIS.

Comments to Draft or Final Compensatory Mitigation Plan

There have been several iterations of the Draft or Final Compensatory Mitigation Plan (CMP) that have substantially changed from January 2019 to January 2020 with little to no time afforded to cooperating agencies and the public to review the revised CMP. The proposed compensatory mitigation actions are inadequate and not appropriate for replacing the habitat and ecosystem

functions that would be permanently lost as a result of the proposed project. Furthermore, the public and people of the Bristol Bay Region will not be allowed to review the CMP and provide input on this critical mitigation proposed to offset the extensive irreversible and irretrievable loss of habitat from this proposed project.

Stream miles of fish habitat permanently removed for resident and anadromous species increased from the DEIS to the PFEIS. No real explanation was given for this increase. It appears that only streams currently identified as providing anadromous fish habitat are being considered for mitigation. An adequate baseline is needed for existing environmental conditions informed by conducting additional studies to thoroughly inventory anadromous waterbodies and update the Anadromous Waters Catalog (AWC) to ensure that all waters supporting salmonids with protections under AS 16.05.871 are accounted for and considered in the compensatory mitigation plan. Additionally, potential impacts in all affected areas must be mitigated so that existing habitat and watershed processes can function.

According to the CMP, temporary impacts will not be mitigated. Impacts are considered "temporary" for the transportation corridor and construction and placement of the pipeline. These are not temporary or short-term impacts. Roads and pipelines will permanently alter and bifurcate functioning habitat and create fragmented and disconnected habitats and migratory corridors. These impacts will remain in perpetuity and cannot be considered temporary. These impacts must be adequately mitigated including the numerous culverts and bridges that will remain on the landscape indefinitely or in perpetuity.

A functional wetland assessment has not been conducted. It is not clear how the acres of wetlands and miles of anadromous streams to be mitigated were identified and determined. Wetland and riverine habitat acreages and miles appear to be underestimated. For example, a decision was made to not include riffle and pool habitat complexes because they "cannot be quantified, because these resources were not explicitly or consistently identified during baseline mapping." There are large areas of riffle and pool habitat across the Assessment Area and watersheds, this is clearly an enormous data gap that must be addressed as these are special aquatic sites that contribute to functioning habitat for anadromous and resident fish species and other aquatic species.

Because no functional assessment was conducted, it is not clear how an appropriate replacement ratio can be determined. According to the CMP, the proposed project will destroy 8.5 miles of pristine anadromous stream habitat. Fixing culverts in other watersheds impacted by roads will not restore or replace the lost habitat and function in the Assessment Area. Additionally, the areas identified for culvert replacement are not similar to the Assessment Area, since these areas have

roads. Fixing culverts on these roads to provide fish passage to habitat that is not as natural and pristine as the habitat which will be destroyed is not appropriate. Given the pristine condition of the Assessment Area, it is preposterous that a 1:1 ratio is being proposed for anadromous streams, and no ratio is being proposed for non-anadromous streams. Using a 1:1 ratio for 8.5 miles of anadromous streams could result in only one culvert being replaced in some other watershed. Culverts in need of replacement are often capital improvement projects and the responsibility of others. Furthermore, no ratio or true compensatory mitigation is being recommended for the loss of over 2,000 acres of pristine wetlands. Aside from culvert work being proposed to compensate for loss of anadromous streams, it is not clear what type and size of habitat are being proposed for compensatory mitigation through the water treatment plant and beach cleanup work.

Wastewater facility improvement projects are capital improvement projects and are typically the responsibility of others. This is specifically called out in the CMP Water Quality Improvement Projects Plan:

> *Federal and state agencies have programs to provide essential capital funds for repairing existing facilities and building new ones. The funding for proper operation and maintenance (O&M) of sanitation facilities is not traditionally part of any federal or state plan. Recognizing this deficiency, Congress amended the Indian Health Care Improvement Act of 1976 by passing the Indian Health Amendments of 1992, authorizing the Indian Health Service (IHS) to provide, for the first time, up to 80 percent of the O&M funding needed by economically deprived Native communities . . . Sanitation projects are also funded and supported by the Alaska Native Tribal Health Consortium (ANTHC). Wastewater sanitation projects in rural areas often require the joint participation of IHS, ADEC's VSW Program, and ANTHC.*

According to the CMP, "*the rehabilitation of wastewater treatment plants would not result in a gain of aquatic resources area for purposes of tracking "no net loss" of wetlands; however, it can still be used to compensate for a loss in resource area.*" It is unclear how it can be used to compensate for a net loss in the resource area as this approach is not mitigating the loss of habitat and function in a pristine, naturally functioning watershed. Expanded wastewater facilities will also permanently destroy additional habitat so it is unclear how these efforts can be counted as mitigation. Additionally, fixing or replacing manholes does not begin to compensate for the loss of pristine habitat.

The CMP seems to rely heavily on the 2018 Alaska Mitigation Memorandum of Understanding (MOA) which is informal guidance and does not have the force of a regulation or enforcement. The CMP must follow the 2008 Mitigation Rule which is the federal law supporting the USACE's

general policy that, for individual permits, "all compensatory mitigation will be for significant resource losses which are specifically identifiable, reasonably likely to occur, and of importance to the human or aquatic environment." (33 CFR Part 320.4(r)). The CMP has identified no in-kind compensatory mitigation. It has only identified out-of-kind mitigation. In general, in-kind mitigation is preferable to out-of-kind mitigation because it is most likely to compensate for the functions and services lost at the impact site.

It is ironic that the 2018 Alaska Mitigation MOA uses the following example for out-of-kind compensatory mitigation: "*restoring or enhancing streams and their riparian areas impacted by mining and other activities to improve fish habitat and other stream functions.*"

It is also ironic that the CMP neglects to consider impacts to upland terrestrial areas that support wildlife species given the following portion of the MOA:

> *Even where a practicable alternative exists that would have less adverse impact on the aquatic ecosystem, the Guidelines allow it to be rejected if it would have other significant adverse environmental consequences (see 40 CFR Part 230.10(a)). This flexibility allows for the consideration of adverse impacts to other ecosystems in deciding whether there is a less environmentally damaging practicable alternative. For example, in some areas of Alaska, impacts to certain uplands, such as moose calving areas or important riparian habitat next to rivers and streams inhabited by anadromous fish should be considered as part of such an analysis. Hence, in applying the alternatives analysis required by the Guidelines, it is not appropriate to select an alternative where minor impacts on the aquatic environment are avoided at the cost of substantial impacts to other natural environmental values.*

According to the 2008 Mitigation Rule (33 CFR Part 332.3 (e)):

> *Mitigation Type.*
>
> *(1) In general, in kind mitigation is preferable to out-of-kind mitigation because it is most likely to compensate for the functions and services lost at the impact site. For example, tidal wetland compensatory mitigation projects are most likely to compensate for unavoidable impacts to tidal wetlands, while perennial stream compensatory mitigation projects are most likely to compensate for unavoidable impacts to perennial streams. Thus, except as provided in paragraph (e)(2) of this section, the required compensatory mitigation shall be of a similar type to the affected aquatic resource.*

(2) If the district engineer determines, using the watershed approach in accordance with paragraph (c) of this section that out-of-kind compensatory mitigation will serve the aquatic resource needs of the watershed, the district engineer may authorize the use of such out-of-kind compensatory mitigation. The basis for authorization of out-of-kind compensatory mitigation must be documented in the administrative record for the permit action.

(3) For difficult-to-replace resources (e.g., bogs, fens, springs, streams, Atlantic white cedar swamps) if further avoidance and minimization is not practicable, the required compensation should be provided, if practicable, through in-kind rehabilitation, enhancement, or preservation since there is greater certainty that these methods of compensation will successfully offset permitted impacts.

According to the 2008 Mitigation Rule (33 CFR 332.3 Part (f)(2)):

Amount of compensatory mitigation.

The district engineer must require a mitigation ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site. The rationale for the required replacement ratio must be documented in the administrative record for the permit action.

The proposed compensatory mitigation actions are severely inadequate to replace the thousands of acres of functioning wetland habitat and hundreds of miles of stream habitat that will be lost as a result of the proposed project. Furthermore, public and community involvement during marine debris cleanup efforts is not appropriate and should not be accepted as Applicant- or permittee-responsible mitigation.

The following points are to summarize the comments above:

- Culvert replacement does not restore permanently removed pristine, naturally functioning habitat, function, and services.

- Wastewater facility upgrades do not restore destroyed pristine, naturally functioning habitat, function, and services.

- Marine debris (beach garbage) cleanup does not restore lost pristine, naturally functioning habitat, function, and services.

MIDGARD
ENVIRONMENTAL SERVICES

From: Richard K. Borden, Midgard Environmental Services LLC

To: George Alexie, President – Nondalton Tribal Council

Date: February 20, 2020

Subject: Review of the January 2020 Pebble Project Compensatory Mitigation Plan (Section 404 Permit Application POA-2017-00271)

The Pebble Partnership (Pebble) released a new Compensatory Mitigation Plan (CMP) in January 2020. The CMP is intended to identify offsets for the large unavoidable impacts to wetlands, rivers and streams in the Bristol Bay region that would result from the Pebble Project. Ideally compensatory mitigation should occur as close as possible to the area of disturbance and should preserve or enhance similar habitats to those being harmed by the project.

The new CMP does provide more concrete mitigation offsets than the draft plan submitted in 2019. However, the new CMP makes no attempt to quantify the relative benefits provided by the proposed offsets in comparison to the large impacts associated with the proposed mine development. In reality, although the proposed mitigation options will certainly provide some environmental benefits, they are very small in scale. All of the offsets are far from the proposed mining impacts and in some important cases are not even in the Bristol Bay region. Most of the proposed compensatory mitigation is also out-of-kind and will not directly compensate for the large losses caused by mining out wetlands and streams for the open pit or filling them in with waste rock and tailings. **Based upon a careful review of the proposed mitigation projects, it is my profession opinion that they will almost certainly offset less than ten percent of the Pebble Project's impacts to Waters of the United States in the Bristol Bay region and may offset significantly less than one percent.** This is clearly inadequate for impacts in such a sensitive environmental setting.

According to the CMP, the Pebble project would impact over 3000 acres of wetlands and streams. This includes the permanent loss of 2163 acres of wetlands, 8.4 miles of river and stream channels that provide salmon habitat and an additional 13 miles that provide habitat for other resident fish species. Almost all of the permanent losses occur at the mine and would impact pristine, high-functioning aquatic ecosystems in the headwaters of the Koktuli River.

Within the areas of permanent impact, nearly 100% of the current ecosystem services provided by these Waters of the United States would be lost. The CMP also does not account for the many miles of additional indirect impacts to salmon-bearing rivers and streams caused by permanent river crossings and mining-related changes in flow regime, temperature and water chemistry. **To offset the proposed mine's very large and near certain impacts, the CMP proposes three small mitigation projects that would provide unquantified but likely minor benefits to fish habitat in the Bristol Bay region:**

1) Improvements in municipal wastewater treatment and collection infrastructure in three small villages on or near Lake Iliamna;
2) Upgrading of some existing culverts to reduce barriers to fish movement and improve access for up to 8.5 miles of salmon-bearing streams and rivers; and
3) Cleanup of marine debris from about 7.4 miles of beach.

Municipal Wastewater Treatment – Pebble proposes to increase the wastewater treatment and storage capacity and/or improve collection systems at the villages of Kokhanok, Newhalen and Nondalton. While these projects certainly have some merit and are likely to improve the reliability and performance of the wastewater treatment plants, in total these three communities have less than 700 people. Although they are evidently in need of improvements, the three treatment systems are already in operation and are actively treating wastewater. Pebble provides no quantifiable information on the current state of water quality in the receiving environments below the plants, no estimates of the surface area impacted nor makes any estimate of the expected improvements in receiving environment water quality or habitat that would result from these projects. If ecosystem function is not already significantly impaired in the receiving habitats downstream of the plants, then these offsets may provide no measurable compensatory mitigation. Furthermore, even if the plant upgrades do reduce risk or provide measurable improvements in ecosystem function, given how small the waste water flows are, the improvements are unlikely to provide a significant offset to the large impacts associated with the Pebble Project.

Upgrading of Existing Culverts – Pebble proposes to upgrade a number of undersized or damaged culverts to improve salmon access to as much as 8.5 miles of upstream aquatic habitat. The project is, at best, conceptual in nature and Pebble proposes to defer selection of specific culvert replacement projects until after the EIS is completed. However, as shown on Figure 1 of Attachment 4 of the CMP, only 8 culverts within the Bristol Bay watershed have been evaluated for replacement. To put this into perspective, the Pebble Project would install more than 80 new culverts into rivers and streams during access road construction. If even ten percent of these new road crossings do not meet the intended performance criteria for fish passage, then the proposed culvert upgrades will not even offset the impacts associated with the transportation corridor alone. Even under the most optimistic scenarios, it is also unclear how the permanent loss of almost all ecosystem function in 21 miles of fish-bearing streams and 2163 acres of wetlands due to open pit mining, waste rock placement and tailings disposal

could be offset by some as yet unmeasured and likely incremental improvement in fish access to 8.5 miles of otherwise healthy rivers and streams. Again, Pebble makes no attempt in the CMP to quantify the relative project impacts versus the environmental gains provided by replacing a small number of culverts.

Beach Cleanup – The CMP makes no attempt to quantify the relative environmental benefits of the proposed beach cleanup compared to the large-scale impacts associated with the Pebble Project. This is a true out-of-kind offset and it will provide no direct compensation for the permanent loss of wetlands and stream channels at the mine. Even a semi-quantitative comparison of the projects benefits will be difficult to make. However, given its small scale, the beach cleanup would almost certainly provide a minimal environmental benefit compared to the large impacts associated with mine development. For example, assuming the beach is 100 feet wide on average the total surface area for the cleanup is at most 90 acres (4% of permanent mine disturbance to Waters of the United States). From the photos in the CMP, marine debris appears to cover only a few percent of the beach surface. Conservatively assuming it covers ten percent and that 100% of ecosystem function is lost where the debris is resting yields a maximum quality-acre improvement of 9 acres. The total offset associated with the beach cleanup is thus almost certainly substantially less than 0.5% of the acreage that would be permanently lost at the mine.

Please let me know if you need any additional information or would like to discuss any of these conclusions.

Sincerely,

Richard Borden
Owner, Midgard Environmental Services LLC

MIDGARD ENVIRONMENTAL SERVICES

From: Richard K. Borden, Midgard Environmental Services LLC

To: George Alexie, President – Nondalton Tribal Council

Date: March 5, 2020

Subject: Review of the Draft Final Pebble Environmental Impact Statement (Section 404 Permit Application POA-2017-00271)

The Pebble Limited Partnership (Pebble) released a preliminary final version of the Environmental Impact Statement (PFEIS) in February, 2020 to cooperating agencies and tribes. Given the short time frame available for a review of the PFEIS, I have not been able to perform a comprehensive review of the entire document. Instead, I focused my evaluation on only five of the key strategic deficiencies identified during my more detailed review of the draft EIS (DEIS) in 2019. The strategic focus areas summarized in this memorandum are: water treatment, the Compensatory Mitigation Plan, the Reclamation and Closure Plan, catastrophic failure scenarios and project economics. While the PFEIS and its supporting documentation do appear to have been modified in an attempt to respond to a number of the identified flaws in the DEIS, in each case the refinements are inadequate to address the original deficiencies. In particular, the decision to ignore data gaps that could only be filled by additional field work has prevented many concerns from being fully addressed. **The PFEIS still contains insufficient detail to determine if the planned actions are adequate or practicable; potential impacts and risks are commonly understated while potential benefits are overstated; and essential analyses and designs are still being deferred to the post-EIS permitting period. Based upon a detailed review of these five critical issues, the PFEIS is still fatally flawed and does not meet industry standard practice.**

I am an environmental scientist and manager with over thirty years of experience in the mining and consulting industries. During my 23 years with the global mining company Rio Tinto I have been involved in the strategic environmental design of several new mines. I have performed environmental, permitting and closure work at over fifty mines, projects and operations. This included over seven years as Head of Environment for Rio Tinto's Copper, Copper & Diamonds and Copper & Coal Product Groups. I have published numerous papers on mine environmental

performance and management in peer reviewed scientific journals, conference proceedings and books. I am intimately aware of the environmental challenges and issues posed by the responsible permitting, development, operation and closure of large copper mines.

Water Treatment

Given the very high geochemical risk of the Pebble ore body, the extremely wet climate and the extreme sensitivity of the Bristol Bay watershed, water management at the proposed mine is an issue of critical importance. The PFEIS estimates an average of more than 13,000 gallons per minute of water will require very costly and complex treatment during operation and an average of 26,000 gallons per minute will need to be treated in early closure. Both of these estimates have actually increased from the 2019 draft. The proposed treatment plant designs are extremely complex with five to ten individual treatment steps. **I am still not aware of a treatment flowsheet of this complexity being applied to such high flows anywhere else in the world.** No significant new design or test work has been completed for water treatment since the DEIS, and according to the Pebble's response to RFI021h in December, 2019 there are no plans to do detailed design, pilot plant test or mass balance work until after the EIS is compete and State permit applications are being developed. An external review of the current treatment plant design that was completed for the DFEIS strongly supports my concerns about the ability of the plants to meet discharge water quality criteria.

Section 4.18 (Water and Sediment Quality) of the PFEIS acknowledges that the design is still only conceptual in nature. Appendix K4.18.2.5 (Review of Water Treatment Plant Methodologies) further states that:

"It should be disclosed that the approaches have not been demonstrated elsewhere at the scale of the Pebble Mine, and the specific configurations of treatment processes have not been commercially demonstrated. The technical viability of this strategy would require further evaluation during the permitting phase with the State of Alaska to demonstrate that the configurations can achieve the suggested water quality."

and

"The removal efficiencies for various constituents are quite high relative to performance observed at other operating mine treatment systems in the world. Although PLP has provided literature references as the basis for their assumption, the information appears to be optimistic."

Section 4.18 also states "concerns regarding potential long-term increased total dissolved solids [TDS] levels may require further investigation as design progresses, and/or adaptive management strategies are implemented during operations".

Increasing TDS within the process and contact water circuits could compromise the performance of the currently proposed water treatment plants and may have no practicable solution at the scale required at Pebble.

Given these very real and clearly acknowledged concerns about the ability of the water treatment plants to meet discharge criteria, any conclusions in the PFEIS showing a lack of harm to downstream receiving environments due to water quality are poorly supported and are not technically defensible.

Compensatory Mitigation Plan

Pebble released a new Compensatory Mitigation Plan (CMP) in January 2020. The CMP is intended to identify offsets for the large unavoidable impacts to wetlands, rivers and streams in the Bristol Bay region that would result from the Pebble Project. Ideally compensatory mitigation should occur as close as possible to the area of disturbance and should preserve or enhance similar habitats to those being harmed by the project.

The Pebble project would impact over 3000 acres of wetlands and streams. This includes the permanent loss of 2163 acres of wetlands, 8.4 miles of river and stream channels that provide salmon habitat and about 13 additional miles that support other resident fish species. Almost all of the permanent losses occur at the mine and would impact pristine, high-functioning aquatic ecosystems in the headwaters of the Koktuli River. Within the areas of permanent impact, nearly 100% of the current ecosystem services provided by these Waters of the United States would be lost.

The new CMP does provide more concrete mitigation offsets than the draft plan submitted in 2019. However, it makes no attempt to quantify the relative benefits provided by the proposed offsets in comparison to the large impacts associated with the proposed mine development. The CMP only proposes three small mitigation projects that would provide unquantified but likely minor benefits to fish habitat in the Bristol Bay region:

1) Improvements in municipal wastewater treatment and collection infrastructure in three small villages (less than 700 people total) on or near Lake Iliamna;
2) Upgrading of some existing culverts to reduce barriers to fish movement and improve access for up to 8.5 miles of salmon-bearing streams and rivers; and
3) Cleanup of marine debris from about 7.4 miles of beach.

All of the offsets are far from the proposed mining impacts and in some important cases are not even in the Bristol Bay region. Most of the proposed compensatory mitigation is also out-of-kind and will not directly compensate for the large losses caused by mining out wetlands and streams for the open pit or filling them in with waste rock and tailings. **Based upon a careful review of the proposed mitigation projects, it is my profession opinion that they will almost certainly offset less than ten percent of the Pebble Project's impacts to Waters of the United**

States in the Bristol Bay region and may offset significantly less than one percent. This is clearly inadequate for impacts in such a sensitive environmental setting. Additional detail on the CMP is provided in a separate memo dated 20 February, 2020.

Reclamation and Closure Plan

Successful closure of the proposed Pebble Mine would be very challenging and costly. Despite this, no Reclamation and Closure Plan was available during the DEIS public comment period; and the plan that was released in late July, 2019 is at best conceptual in nature. **The Reclamation and Closure Plan contains insufficient detail to determine if the proposed closure strategies are practicable or how they would actually perform.** Key strategic deficiencies in the closure plan include:

In Appendix K4.18 of the PFEIS it is estimated that 5800 gpm will need to be treated in the long-term post-closure, and in the Executive Summary it acknowledges that "long-term is defined herein as lasting centuries". The water treatment plant proposed for this in-perpetuity treatment has the same complexity, uncertainly and potential fatal flaws of the similar treatment plants proposed for the operational period (see Water Treatment section in this memorandum). Given these very real and clearly acknowledged concerns about the ability of the water treatment plants to meet discharge criteria, any conclusions in the PFEIS showing a lack of harm to downstream receiving environments in the closure period due to water quality are poorly supported and are not technically defensible.

The plan makes several commitments that will almost certainly require hundreds of millions of cubic yards of material movement if executed in good faith. Key commitments made in the plan include: re-establishment of natural drainage through embankments that are up to 425 feet high; recontouring of the bulk TSF to change it from a water retaining concave to a water shedding convex surface; construction of a thick infiltration limiting cover over the entire bulk TSF; placement of three feet of growth media in quarry areas; recontouring of slopes to 3:1 horizontal:vertical and placement of at least 6-12 inches of growth media on most disturbed areas. However, other than a very simple topsoil balance, the plan makes no attempt to quantify these extremely large material movement requirements.

Limiting of infiltration on the bulk TSF surface is a critical part of Pebble's proposed closure strategy to minimize water seepage requiring perpetual treatment and to reduce the mass of saturated tailings, improving long term geotechnical stability. There are significant inconsistencies between the 2019 plan and the PFEIS and within the PFEIS itself. In some cases, it is stated that an HDPE liner will be installed with an overlying soil cover, while in others it states that a compacted till layer or equivalent with an overlying soil cover will be constructed. These two alternatives change the volume of infiltration by roughly a factor of ten and so would have a profound influence on both seepage requiring treatment and on tailings saturation.

The plan is completely silent about the extensive and very costly support facilities that will be required for centuries after closure to allow ongoing water collection, water treatment, monitoring and maintenance activities to occur. These facilities include on-site housing, power generation, offices, workshops and replacement water treatment plants as well as maintenance of the long transportation corridor to the remote site.

The 2019 Reclamation and Closure plan makes no attempt to estimate closure costs; instead deferring any cost estimation to the post-EIS permitting period. The total closure costs are still almost certain to exceed 1.5 billion dollars and are likely to exceed two billion dollars (estimate from Borden comment letter to the US Army Corps of Engineers, May 31, 2019). Given the almost certainly unfavorable project economics for the 20-year mine plan, it is unclear how such large costs would actually be paid for.

The PFEIS repeatedly states that a more refined closure plan with a cost estimate will not be completed until after the EIS is completed and the State permitting process has begun. This is clearly unacceptable given the strategic risks and uncertainties associated with closure of the proposed Pebble mine as it would mean that potential fatal flaws in the closure strategy will not be resolved or confirmed until after the EIS evaluation is completed.

Catastrophic Failure Scenarios

Pebble's active seismic setting, wet climate, sensitive environment and large mass of chemically reactive tailings all contribute to a very high innate risk of catastrophic release. However, the PFEIS still evaluates anomalously small release scenarios representing only 1) 0.004% of produced bulk tailings that must be contained on site forever, 2) 0.6% of produced pyritic tailings and 3) 0.4% of untreated process water typically stored on site. **Many of the reasons provided in the Executive Summary and later chapters of the PFEIS (Section 3.5 Spill Risk) to explain why catastrophic failure scenarios were not evaluated are either misleading or incorrect.** Key examples include:

"Bulk TSF design would include no water cover" – However the PFEIS acknowledges that a supernatant or water reclaim pond will need to exist on top of the tailings impoundment throughout operation and in the early years of closure.

"Bulk TSF would be a flow-through design" – It is certainly acknowledged that, if built as designed, the embankment itself will be a free-draining structure with a very low water table. However, the vast majority of tailings held behind the embankment will remain saturated throughout the operational period. Furthermore, it is acknowledged in Appendix K4.15 (Geohazards and Seismic Risk) that "It is uncertain, whether the thickened tailings at 55% solids would segregate enough, with coarse tailings forming the tailings beach near the spigots and finer tailings in the middle of the impoundment, to promote reduction of the phreatic surface near the bulk TSF main embankment, which has implications for embankment stability."

"Tailings would be thickened versus slurry" – In reality the PFEIS states that the tailings will only be thickened to 55% solids and 45% water by weight – this is still a slurry. This is a standard industry practice using a conventional thickener and by no means represents a form of dry tailings disposal.

"At closure, bulk TSF would be covered, allowed to dewater, and would become a stable landform" – Given the extremely wet climate at Pebble, there will almost certainly be high infiltration rates into the closed impoundment and a majority or a substantial minority of the tailings are almost certain to remain saturated forever. Furthermore, the PFEIS acknowledges that up to 15 inches/year (roughly a billion gallons/year) of water may infiltrate into the TSF if it is only closed with an industry standard soil cover.

"USACE determined the probability of a full dam breach to be very low for the bulk TSF" – It is certainly true that this would be a very low likelihood but very high consequence event if the embankments are actually constructed as designed and if the current assumptions about foundation conditions, earthquake intensity and operating conditions are actually correct. However, Section 4.27.8.6 (Risk Assessment for the Proposed Embankments) acknowledges that "The current level of embankment design for the project is at a very early phase, considered a conceptual phase. Site investigation and engineering plans are still ongoing." Furthermore, Appendix K4.15 states "Uncertainties remain regarding the range of embankment stability effects under different phreatic surface, pore pressure and ground shaking conditions, leading to lingering concerns that some and perhaps all of the entire centerline part of the bulk TSF main embankment (not just the shallow raises) could slide into potentially undrained tailings and have consequent effects in a downstream direction" and "It is acknowledged that the current pseudo-static analyses are based on preliminary estimates of homogeneous foundation conditions, and that deep-seated slide risks on potential weak zones can be triggered by earthquakes". It is also stated that additional field work and analysis is required to understand these risks. Either type of failure event could release tens to hundreds of millions of tons of bulk tailings into the downstream rivers with the potential to profoundly and permanently harm a pristine globally-significant ecosystem and fishery.

Given the high risks and significant uncertainties it is inexplicable why the PFEIS does not evaluate the impacts of a low likelihood but high consequence catastrophic failure event. In the absence of any such analysis and until it is definitively proven not to be needed, the main bulk TSF embankment should also be required to be constructed using the downstream method (Alternative 2). The downstream method is generally considered to be more stable than the currently proposed centerline construction method (Applicants preferred alternative).

The FEIS also failed to adequately address the catastrophic failure risk posed by pit wall failure into the pit lake at closure that could generate a seiche wave and release billions of gallons of untreated water. Additional geotechnical modelling was performed, and it did show a significant risk of earthquake-induced pit wall failure in the post-closure pit (Appendix K4.15). An analysis was also performed of a landslide-induced pit lake wave that predicted "even with

the conservative approximations, the waves do not overtop the rim, although they reach close to the rim in the slide scenario for Section A." This would indicate that a seiche wave could destroy water management infrastructure in the pit and might result in worker fatalities, but there would be no release. However, for some reason the analysis was performed for a pit lake that was only 250 feet deep, but in Appendix K4.18 it states repeatedly that the lake depth will be 420 to 530 feet deep. The 2019 Reclamation and Closure Plan also states that the fully flooded pit lake will be 530 feet deep and would hold 60 billion gallons of contaminated water. This is a significant difference and might mean that a large seiche wave actually would overtop the pit rim. In order to truly define the potential risk and select mitigation strategies if needed, the analysis should be repeated using the fully flooded pit lake volumes.

Project economics

The mine plan being evaluated by the PFEIS is almost unchanged from the DEIS plan. In particular the total mass of copper, gold and molybdenum that would be produced over the 20-year mine life is exactly the same. The PFEIS plan still only targets roughly 10% of the ore body and by necessity must process relatively low-grade ore. It only produces half as much metal for sale as the smallest mine plan economic evaluation which is publicly available (Wardrop, 2011, Preliminary Assessment of the Pebble Project). Project infrastructure requiring construction is also little-changed except as noted below. The economic evaluation performed in 2019 (Borden, March 28, 2019 Comment Letter to the US Army Corps of Engineers) is still valid and the PFEIS mine plan is still almost certainly not economically feasible, with an estimated negative net present value of roughly three billion dollars.

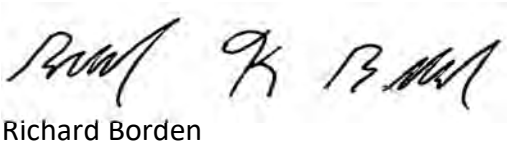
If anything, recent changes in the mine design between the DEIS and the PFEIS have made the project less, not more economic. A comparison of the December 2018 to the December 2019 project descriptions indicates the following substantive changes:

- The amount of potentially acid generating waste rock requiring special management within the pyritic TSF has increased from 50 to 93 million tons maximum. This will increase operational costs and increases the waste rock mass that will need to be moved back to the open pit at closure.
- The transportation corridor has increased from 83 to 100 miles including a 10% increase in road length and a 50% increase in the lake crossing. This will increase both initial construction costs and ongoing operational costs.
- There is a small (3%) increase in the estimated water flows that must be treated during operations but a 15 to 35% increase in water requiring treatment during different phases of closure (Appendix K4.18). This change alone is likely to increase total closure costs by about 15% (greater than $200 million).

The PFEIS is still almost certainly not evaluating the true environmental impacts and risks associated with a viable mining project. Even a small expansion of the project to extract 20% of the ore body would almost double the size of the disturbed footprint, quadruple water quality risks and spread large scale impacts into three different river drainage basins.

Please let me know if you need any additional information or would like to discuss any of these conclusions.

Sincerely,



Richard Borden
Owner, Midgard Environmental Services LLC

Nondalton Tribal Council
P.O. Box 49
Nondalton, A.K. 99640
Ph. (907) 294-2257
Fax (907) 294-2271
nondaltontribe@yahoo.com

Via E-Mail

April 3, 2020

Honorable R.D. James
Assistant Secretary of the Army (Civil Works)
108 Army Pentagon
Washington, DC 20310-0108
rickey.d.james.civ@mail.mil

Lieutenant General Todd T. Semonite
Commanding General and Chief of Engineers
U.S. Army Corps of Engineers Headquarters
441 G Street, N.W.
Washington, D.C. 20314-1000
todd.t.semonite@usace.army.mil

Re: Request to Pause Work Related to the Proposed Pebble Mine

Assistant Secretary James and Lieutenant General Semonite:

I am writing to request that the U.S. Army Corps of Engineers (USACE) pause its work related to the proposed Pebble Mine during the COVID-19 crisis. During these difficult and uncertain times, it is imperative for my Tribe, the Nondalton Tribal Council, and other communities in Bristol Bay to focus our attention and resources on keeping our communities safe and healthy. The Alaska District has made clear that it intends to continue working on the environmental impact statement for the proposed Pebble Mine, despite multiple requests from local tribes and community organizations, and will not change its timeline in response to this crisis.

The preliminary final environmental impact statement (PFEIS) for the proposed Pebble Mine was provided to cooperating agencies, including my Tribe, on February 6, 2020, for a 45-day review period. On March 19, 2020, I wrote the attached letter to the Alaska District Engineer, Colonel Philip J. Borders, requesting a 90-day extension to the comment period. In that letter, I explained that additional time was necessary for my Tribe to adequately review and meaningfully comment on the extensive amount of highly technical and complex information contained in the PFEIS and supporting documentation. I also explained that the spread of COVID-19 had significantly disrupted our normal, daily life and created additional obstacles to developing comments on the PFEIS. Requirements for social distancing, self-isolation, and shelter-in-place orders, offices being

shut down or minimally staffed, and the challenges of teleworking significantly impeded my Tribe's ability to develop comments, even with the help of consultants.

The day after my Tribe requested an extension, the Alaska District sent a "REMINDER" email to cooperating agencies reiterating the existing deadline for comments with no acknowledgement of our extension request or the difficult circumstances we were facing. Dismayed by this response, my Tribe continued to develop comments on the PFEIS, diverting critical time and attention from efforts to combat the spread of COVID-19. Only after the comment deadline passed, and my Tribe and many other cooperating agencies had submitted our comments, did the Alaska District provide a one-week extension to the comment period. This meaningless one-week extension provided inadequate time for cooperating agencies facing significant obstacles related to COVID-19. During a regularly scheduled cooperating agency teleconference on March 31, 2020—the day after the extended deadline for comments—the Department of the Interior and the Advisory Council on Historic Preservation stated that they had yet to submit comment on the PFEIS because of difficulties related to teleworking.

Just today, the Alaska District sent my Tribe a draft cultural resource management plan (CRMP), along with two other documents, being prepared as part of the USACE's National Historic Preservation Act Section 106 review. The Alaska District requested that we review these documents and set the deadline to comment on them for April 27, 2020, in just twenty-four days. This, despite the Advisory Council on Historic Preservation's recent guidance encouraging federal agencies to be more flexible with Section 106 deadlines. Again, the Alaska District is expecting my Tribe to divert critical resources and time away from protecting the health and welfare of our community to reviewing and commenting on the draft CRMP. The Alaska District is making us choose between protecting our cultural resources on one hand and protecting our community from COVID-19 on the other. This is unacceptable.

As the COVID-19 crisis intensifies, I am alarmed by the Alaska District's refusal to adjust its timeline in response to these extraordinary circumstances. Recently, Ravn Air, the biggest in-state airline in Alaska, suspended service to small, flight-dependent communities, citing revenue declines related to COVID-19. Stopping these flights severs a vital link between rural communities and urban centers. This is just one of the many challenges facing my Tribe and other Bristol Bay communities as we work to fight the spread of COVID-19.

I hope that you, your staff, and your families are well and safe. I respectfully request your assistance in helping to keep my Tribe and other Bristol Bay communities safe by urging the Alaska District to pause its work related to the proposed Pebble Mine. There is no need, no demand, and no necessity to move this process forward while our Nation addresses this crisis. The minerals at the Pebble deposit will still be there after COVID-19. Sadly, many of our fellow Americans will not. Please pause this process for the time being so that we may focus on the health and safety of our families, communities, and Nation.

Respectfully,

President George Alexie
NONDALTON TRIBAL COUNCIL