

**State of Alaska – Pebble Project Preliminary Draft EIS, Appendix K4.10 - Health and Safety**

<b>Agency</b>	<b>Comment No.</b>	<b>Section, Paragraph , and Page #</b>	<b>Cooperating Agency Comment (and Purpose of Comment)</b>	<b>Proposed Resolution (Additions or Deletion of Text)</b>	<b>Response</b>
ADHSS/ DPH/SOE	1	K4.10	Needs edits: For example, Lake and Peninsula Borough (LPB) community-level baseline data (≤ 2016) are available for leading hospitalizations by diagnosis, leading causes of non-fatal injuries, and leading causes of death (see Section 3.10, Health and Safety, HECs 2 and 7), while similar community-level data are not available for the Nushagak/Bristol Bay communities.	Suggested edit: For example, Lake and Peninsula Borough (LPB) regional-level baseline data (from 2016-2017) are available for leading hospitalizations by diagnosis, leading causes of non-fatal injuries, and leading causes of death (see Section 3.10, Health and Safety, HECs 2 and 7), while similar regional-level data are not available for the Nushagak/Bristol Bay communities (edited because community-level data was not presented)	The suggested edit was made.
ADHSS/ DPH/SOE	2	K4.10	"For example, Lake and Peninsula Borough (LPB) community-level baseline data (≤ 2016) are available...while similar community-level data are not available for the Nushagak/Bristol Bay communities." These data are available, just not with the report used for this draft section. Also, some of the data is actually presented in HECs 2 and 7, so this sentence needs some revision	Revise sentence	This sentence was revised to "In other cases, Iliamna Lake/Lake Clark community-level baseline data are available for unintentional injury death rates (2016), but are not available for the Nushagak/Bristol Bay communities (see Section 3.10, Health and Safety, HEC 2)."
ADHSS/ DPH/SOE	3	K4.10	Rephrase for clarity, and add number of jobs to provide context: "PLP exploration-related employment and income—which were realized in the Bristol Bay region over the previous decade—would cease. Human health impacts associated with the loss of jobs and decrease in household income for communities closest to the mine site (Nondalton, Iliamna, and Newhalen) would be expected to be minor in magnitude, with	Add job detail information. Suggest revising passage to read: "Human health impacts associated with the loss of employment opportunities (and subsequent decrease in median household income) primarily concern potential impacts on SDH (e.g., income, psychosocial stress, substance abuse, and	Passage was revised as suggested.  In addition, the following was added to the preceding paragraph: The PLP employed around 100 and 150 local community members annually at the site during the pre-development phase of the project, which ended in 2012 (Loeffler and

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			changes relative to baseline; with potential increases or decreases in SDH, such as income, psychosocial stress, substance abuse, and family stability."	family stability). Any expected changes in SDH would be relatively minor in magnitude, relative to baseline, and would largely be confined to the communities closest to the mine site (Nondalton, Iliamna, and Newhalen).	Schmidt 2017). Since then, PLP has had a minimal number of workers at the site for exploration and maintenance activities.
ADHSS/ DPH/SOE	4	K4.10	"The HIA does not evaluate human health impacts from potential spills or failures. The potential health impacts from exposure to chemicals due to a spill or failure are unanticipated and are typically short-term, acute exposures." While the HIA model used in this appendix may not be designed to discuss all possible spill/failure possibilities, it is reasonable to include a discussion of such potential impacts in the Health and Safety sections of an EIS. For example, findings from Section 4.27 Spill Risk should be integrated into Health and Safety Sections, where relevant. Furthermore, while direct human exposure may be short-term or acute following a spill, there are other routes of exposure (e.g., consumption of contaminated foods and/or water, maternal transfer through breastmilk) that can persist long after an initial spill event. This can create chronic exposure scenarios for humans that have long-term health implications.	Recommend discussing the potential impacts of spills/failures in the Health and Safety sections of the EIS, including the potential for indirect routes of exposure to create chronic exposure scenarios. Findings from Section 4.27 Spill Risk should be integrated into Health and Safety Sections, where relevant.	The text was modified to indicate that potential health impacts from exposure to chemicals due to a spill or failure may also lead to chronic exposure. In addition, the text was modified to summarize Section 4.27, Spills Risk, including the spill scenarios evaluated and the health impacts that may occur from the evaluated spill scenarios.
ADHSS/ DPH/SOE	5	K4.10.2.1	This table should go after the narrative, which would be consistent with summary tables for the other HECs	Move table to after narrative for HEC	The suggested edit was made.
ADHSS/ DPH/SOE	6	K4.10.2.1	Increase in household incomes row: check math. There's an addition error in the third	Correct severity and impacts rankings by ensuring all ratings	The severity and impact rankings were verified and adjustments

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E			part of this row	have been added correctly.	made, as needed.
ADHSS/ DPH/SO E	7	K4.10.2.1	Magnitude for the first potential impact (increased in household incomes..) is better represented as a 1 for closure, since jobs will significantly decrease and households will have to adjust to this change	Revise rows related to this potential impact	The magnitude during closure was adjusted, as requested.
ADHSS/ DPH/SO E	8	K4.10.2.1	Geographic extent for the first potential impact (increased in household incomes..) is better represented as a 1 for closure, since jobs will significantly decrease and households will have to adjust to this change	Revise rows related to this potential impact	The geographic range during closure was adjusted, as requested.
ADHSS/ DPH/SO E	9	K4.10.2.1	Potential impacts due to psychosocial stress: the likelihood during construction and operations is better represented as 33-66% as this impact (pos and neg) is already being reported in households	Revise likelihood ranking for operations and construction and edit impact rating accordingly	The likelihood rating for construction and operations was adjusted, as requested.
ADHSS/ DPH/SO E	10	K4.10.2.1	For "The project would result in 2,000 jobs during the construction phase, and 850 jobs during the operations phase, and some jobs would continue during closure", add number of jobs expected for PACs (i.e., likely about 50% of local hire for construction).	Add additional job # estimates	The following text was added: PLP has stated that its objective is to maximize opportunities for local hire; first, directly to residents of the EIS analysis area, or those with close ties to the area; and then to Alaska residents in general. It is estimated that 250 employees would come from surrounding communities, and the remaining 600 would be flown to the project from Anchorage or Kenai. However, it is likely that during the construction phase, significant non-Alaskan labor would be required to fill the anticipated 2,000 jobs, potentially as high as 50 percent of hires (PLP 2018-RFI 027).

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ADHSS/ DPH/SOE	11	K4.10.2.1	For "The project would result in 2,000 jobs during the construction phase, and 850 jobs during the operations phase, and some jobs would continue during closure", add number of jobs expected for closure and some information of potential % of local workers. Data from another Alaska mine as an example may help add context	Add additional information	As noted in preceding response, PLP's objective to maximize opportunities for local hires. However, employment numbers during the closure phase are not available. Instead a bullet was added to this section noting that there would be negative impacts related to job losses and decreased income for communities and households during the closure phase, who would then need to adjust to this change.
ADHSS/ DPH/SOE	12	K4.10.2.1	For the bullet discussing the benefits of employment opportunities: addition of examples from other similar-scale projects may be useful	Add additional information	Comment noted. Other projects as examples were not added because they are not necessary to inform the process or make project decisions. Additionally, evaluating the relevance and applicability of other project examples to this project would be necessary before such content could be added.
ADHSS/ DPH/SOE	13	K4.10.2.1	"The summary impact to human health due to increased household incomes, employment rates, and education attainment for the potentially affected communities would be Category 3": Potential impacts during closure are better represented as Category 2. See comments on table K4.10-3	Revise category ranking for closure	The magnitude and geographic range during closure were changed, and the Impact Category was revised (to a Category 2), accordingly.
ADHSS/ DPH/SOE	14	K4.10.2.1	Comments on household incomes/employment/educational attainment could be supported with examples, such as with data from Red Dog	Consider adding additional detail	Comment noted. Other projects as examples were not added because they are not necessary to inform the process or make project decisions.

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ADHSS/ DPH/SOE	15	K4.10.2.1	"The summary impact to human health due to changes in psychosocial stress for the potentially affected communities is rates as Category 2". Potential impacts during construction and operations are better represented as Category 3. See comments on table K4.10-3	Revise category ranking for operations and construction	The likelihood rating during construction and operations was changed, and the Impact Category was revised (to a Category 3), accordingly.
ADHSS/ DPH/SOE	16	K4.10.2.1	"However, the likelihood of this impact occurring is considered unlikely for all phases, because it is a multi-dimensional aspect that is influenced by many factors, and the probability of a significant contribution from any one factor would be low." Impacts to psychosocial stress (positive and negative) are already occurring for some individuals, so the likelihood should be higher. See comments on table K4.10-3	Revise likelihood rating and edit sentence to reflect changes	The likelihood rating during construction and operations was adjusted. The sentence was revised to reflect the change.
ADHSS/ DPH/SOE	17	K4.10.2.2	"Transportation-related unintentional accidents and injuries account for approximately 44 percent of hospitalizations in the state (Section 3.10, Health and Safety)": Provide some information for each region potentially impacted by each feature of the project (pipeline, mine, etc.), whether that is quantitative or qualitative (if data are largely unavailable)	Provide additional region-specific information	This paragraph was revised to indicate that transportation-related unintentional accidents and injuries account are a leading cause of hospitalizations in the state and within the EIS analysis area (Section 3.10, Health and Safety). Land transportation and motor vehicle incidents are among the three leading causes of hospitalization in the LPB, the Dillingham Census Area, and Bristol Bay Borough, as noted in Appendix K3.10.
ADHSS/ DPH/SOE	18	K4.10.2.2	"The project would work with communities (and supply funding) to provide for the marking and maintenance of snow machine trails between communities across Iliamna	Clarify commitment from company or mitigation measure. Add as a mitigation	This sentence was clarified, PLP is committing to this and a citation to PLP 2018-RFI 071a was added.

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			Lake, when lake ice is thick enough to support such traffic." Clarify if this is a commitment from the company, a mitigation, etc. If not, consider adding this at a mitigation		
ADHSS/DPH/SOE	19	K4.10.2.2	Several sentences in HEC4 (food, nutrition, subsistence) imply that roads, ferries, etc. may be used by the public. This public use possibility, especially when paired with heavy use by workers, could increase accidents/injuries in all parts of the transportation corridor and this should be addressed in K4.10.2.2 (and rated appropriately)	Add clarifications and additional information relating to the interactions of public/workers on features of the project transportation corridor and the potential impacts to accidents and injuries. Make related edits to Table 4.10-4	The text in HEC 2 and HEC 4 both mention potential public use based on PLP 2018-RFI 027. However, clarification text on potential surface transportation impacts to the public in Section K4.10.2.2 was added: "...marked crossing points, or other potential community uses, such as potential shared use of the project roads and potential use of the ferry to transport the public and snowmachines." In addition, the following sentence was also added: "Increased travel distances in pursuit of more distant or alternative subsistence resources may also increase the potential for accidents and injuries for community members engaging in subsistence activities."
ADHSS/DPH/SOE	20	K4.10.2.2	"The likelihood of these accidents occurring range from ..to very unlikely for surface transportation..." Surface transportation would be better represented as unlikely (10-33%). Impact rating remains the same.	Revise likelihood rating for surface transportation and edit sentence to reflect changes	The likelihood rating for surface transportation accidents was adjusted, as requested.
ADHSS/DPH/SOE	21	K4.10.2.2	"...unintentional injuries from falls accounts for 44 percent of hospitalizations in the state..". Regional data are available from sources such as the Alaska Trauma Registry and would be useful to reference to show existing burden (or lack of it) and	Add/reference additional information	This sentence was revised to indicate that unintentional injuries from falls are the primary leading causes of hospitalizations in Alaska, the Lake and Peninsula Borough, and the Dillingham

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			better inform the rating of this impact		Census Area, as well as the second leading cause in Bristol Bay Borough (Section 3.10, Health and Safety).  Information from the Trauma Registry is not available online. Requests are made to the Emergency Programs office and in most instances, provided in summary (aggregate) form. Non-aggregate data require a requested for special research projects through application and in accordance with the Trauma Registry Release of Information Policy.
ADHSS/DPH/SOE	22	K4.10.2.2	"...suicide rates vary by regions..". Mention of regional data and disparities would be useful to reference to show existing burden (or lack of it) and better inform the rating of this impact	Add/reference additional information	Clarification was added that suicide mortality rates vary by region but are based on rates less than 20 cases/counts and may not be statistically reliable. Given this, additional comparisons or evaluations were not added.
ADHSS/DPH/SOE	23	K4.10.2.3	When presenting potential COPC impacts to water quality, it would be useful to add whether monitoring is occurring/will occur at the mine site	Add mention of water monitoring plans when discussing potential COPC impacts to water quality, even if the mention is just as in parentheses	The following sentence will be added to the metals in groundwater bullet: "As discussed in Appendix K.4.17, groundwater levels would be monitored during mine operations to maintain hydraulic containment. Monitoring and contingencies would be further developed as design progresses."
ADHSS/DPH/SOE	24	K4.10.2.3	"In addition, given that these estimates of PM...was further qualitatively evaluated	Revise sentence or move table K2.10-6	This table and associated text have been deleted from the Draft EIS

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E			below": This sentence is at the bottom of the page and is followed by Table K4.10-6, which is not the 'further qualitative evaluation'. Revise sentence to be less confusing.		based on revisions to the report (i.e., Air Quality, Section 4.20).
ADHSS/ DPH/SO E	25	K4.10.2.3	Summary of Air Exposure Pathways: Recommend identifying all source contributions, including atmospheric deposition of highly volatile metals (only dust deposition is mentioned). Because of the bioaccumulative nature of many metals and biomagnification in the food web, it is important to include all routes considered when discussing potential risks to human health.	Recommend including atmospheric deposition of volatile metals as an airborne exposure pathway to subsistence foods, and discussing the potential risk to human health.	This summary paragraph was revised based on revisions to the Air Quality exposure pathway text. Source contributions are identified in the beginning of the Air Quality exposure pathway text. It was clarified in the summary that the air inhalation pathway from all project components would not be expected to impact the health of the affected communities.
ADHSS/ DPH/SO E	26	K4.10.2.3	Mine Site Discharges to Surface Waterbodies: The exposure pathways do not mention atmospheric deposition of volatile metals into nearby bodies of water (only dust deposition). Due to the direct and rapid effects on the food web, it is most useful to report the operational impact on the total Hg loading budget from all sources (including dust, treatment discharge, runoff and volatilization) rather than as a percent increase of sediment and water individually. Recommend also discussing the potential for effluent/runoff/deposition of non-metal contaminants (e.g., sulfates, organic carbon, etc.) to increase the bioavailability of existing metals, including increased rates of mercury methylation and implications for fish tissue concentrations. Increases in sulfates and DOC have been shown to correspond with higher tissue burdens in fish, even in the absence of additional Hg	Recommend reporting the operational impact on total Hg loading budget from all sources (including dust, treatment discharge, runoff and volatilization), and including the impact of other mining discharges on the bioavailability of metals in aquatic ecosystems. Recommend including implications for subsistence foods.	An Evaluation of Mercury for all project sources was added to Section K4.10.2.3 (preceding HEC 3 summary) based on stakeholder concerns.  The focus of metals contributions to soils and surface water bodies is focused on mine site fugitive dust deposition based on the results of the air quality near field-modeling (below AAQS and PSD Class II increments); that annual HAP emissions are estimated to be below the Title V Major Stationary Source (permit) thresholds; mine, port, and pipeline would undergo a complete permitting analysis and would be expected to operate in compliance with these permits; and



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			deposition.		mine site effluent would be treated to ensure compliance with applicable permits and water quality standards prior to discharge (see Section K4.10.2.3). Air and water discharges that are in compliance with permits are presumed to be protective of human health (ADHSS 2015).
ADHSS/ DPH/SOE	27	K4.10.2.3	Mine Site Dust Deposition to Surface Waterbodies: Recommend discussing the uncertainty surrounding the projected 0.11-0.66% of metals in sediment, and 0.1-0.7% increase in surface waters from dust deposition, how the total loading budget of important metals will be affected by these increases, and what these changes predict for fish tissue concentrations. Recommend identifying all the source contributions (dust deposition is consistently mentioned throughout the health sections, but atmospheric deposition of volatile metals is not). Also recommend identifying which metals these estimates include (as of now it only mentions antimony, copper, arsenic and chromium), and the sediment depth this estimate refers to. The sediment quality chapter indicates that the predicted % change in soil values concern elemental mercury concentrations in the top 1-inch, leaving the reader to assume that this depth also applies to sediment. If this is not the case, recommend clarifying. The increase in Hg at the sediment-water interface (~top 1/2-cm) is the value of most importance for bioaccumulation/biomagnification in subsistence foods, as almost all	Recommend expanding discussion and modifying the form of mercury given in the projected increases to MeHg. Discuss in terms of food safety for subsistence consumers, particularly sensitive populations.	<p>Please see the preceding response on why the Human Health section focuses on fugitive dust metals contributions and not atmospheric deposition.</p> <p>A table summarizing project-related COPCs for the health evaluation by source media was added to Section K4.10.2.3 under Anticipated Sources and COPCs header. However, in order to maintain document-wide consistency, this HIA does not repeat detailed information provided in other sections. Potential human health impacts to subsistence are discussed in that subsection.</p> <p>An Evaluation of Mercury for all project sources was added to Section K4.10.2.3 (preceding HEC 3 summary) based on stakeholder concerns.</p>

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			methylation and transfer from sediment to biota occurs here. Also, elemental Hg is not the highly toxic, bioavailable form found in fish. Recommend including the projected changes for mercury in terms of methylmercury concentrations as well, as this is the form of most concern for human health.		
ADHSS/ DPH/SOE	28	K4.10.2.3	Last sentence before the subsistence foods exposure pathways, "Therefore, the incremental arsenic risk/hazard...": This sentence should be about cobalt/manganese, as arsenic was addressed previously	Edit sentence to cobalt/manganese instead of arsenic	This typo was corrected.
ADHSS/ DPH/SOE	29	K4.10.2.3	Subsistence Foods Exposure Pathways: Recommend listing the contaminants of concern for subsistence foods in this paragraph, rather than grouping them as "metals." Maternal transfer should also be discussed as an exposure route for sensitive populations, and maternally transferred metals should be identified. In its present form, it does not appear that atmospheric deposition of volatilized Hg is considered as an exposure pathway for subsistence users (it only seems to include contributions from deposited dust and direct exposure to mining ponds). Here and throughout, please clarify this point.	Please add requested information to the Subsistence Foods Exposure Pathways paragraph.	<p>Please see the preceding response on why the Health section focuses on fugitive dust metals contributions and not atmospheric deposition.</p> <p>The newly added COPC table for the health evaluation includes a column indicating which COPCs are bioaccumulative and a potential concern for subsistence. Additional text regarding bioaccumulative metals was added to the subsistence foods exposure pathway text.</p> <p>An Evaluation of Mercury for all project sources was added to Section K4.10.2.3 (preceding HEC 3 summary) based on stakeholder concerns.</p>

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ADHSS/ DPH/SOE	30	K4.10.2.3	Mine Site Dust Deposition to Wild Foods: Suggest revising the statement "ADEC considers several of these metals to be potentially bioaccumulative" to better communicate the scientific consensus on the bioaccumulative nature of many of these metals. Please specify which abiotic media are expected to increase by how much, as increases in metal concentrations in water, the sediment-water interface, and buried sediments do not affect food web responses to the same magnitude. Biomagnification should be discussed here in addition to bioaccumulation, particularly in the context of relating/translating incremental increases in the metal content of water and sediment to anticipated increases in the tissues of subsistence foods after biomagnification. Projected tissue increases in biota should be based on the operational impact on the total loading budget from all sources for relevant metals.	Recommend revising wording here and throughout, to better communicate the scientific consensus on metal bioaccumulation. A discussion of biomagnification/trophic transfer, and relate projected increases in metal concentrations of water and sediment to changes in the tissue concentrations of subsistence foods would also be useful.	The subsistence foods exposure pathway text underwent substantial revision. Additional discussion regarding bioaccumulative metals, and those that may biomagnify, was added. Although details on project related increases in metals in abiotic media was not repeated in subsistence, when relevant, the increases were summarized and included.
ADHSS/ DPH/SOE	31	K4.10.2.4	Because of the important implications for the quality of subsistence foods for human consumption, recommend adding justification for the statement that "heavy metal concentrations in subsistence foods will be indistinguishable from baseline levels," (include references). A discussion of how the projected increase in metal concentrations in water and sediment will affect the likelihood that subsistence consumers will exceed reference doses (RfD) for relevant metals would be useful, accounting for nearly daily consumption of fish for many residents (and the uncertainty	Recommend adding justification to show that this increase will not result in chronic dietary exposures to any of these metals (i.e. values will not exceed RfDs); accounting for the high fish consumption rate, uncertainty, and the sensitivity of the developing nervous system. Recommend adding references for the aforementioned topics.	The subsistence foods exposure pathway text underwent substantial revisions, including additional text discussing estimated surface water increases relative to water quality standards for consumption of organism, when available. A table listing the potential health effects for metal COPCs was added to the Anticipated Project Sources and COPCs header in Section K4.10.2.3. An Evaluation of Mercury for all project sources was also added to Section K4.10.2.3

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			surrounding estimates). This is a particularly important case to make for sensitive populations. Many of these metals are maternally-transferred developmental neurotoxins, which affect the developing nervous system at very low exposure concentrations.		(preceding HEC 3 summary) based on stakeholder concerns.
ADHSS/DPH/SOE	32	Figure K4.10-1	Health impacts for subsistence users are classified as insignificant.	This figure may need to be revised if the concerns above cannot be sufficiently addressed, particularly for sensitive populations.	Based on the revisions to Appendix K4.10, health impacts for subsistence are expected to remain as complete but insignificant.
ADHSS/DPH/SOE	33	K4.10.2.4	Food security should be discussed in this HEC. Positive and negative effects are possible. Also, as mentioned in a previous comment, cost of living does not equal food security. There are other components to food security and these should be mentioned (for example, access to resources)	Include discussion of food security and potential impacts	As requested, food security was added as a separate potential impact.
ADHSS/DPH/SOE	34	K4.10.2.4	"Additional impacts could include potentially stemming the current trend of out-migration, increasing or maintaining the number of schools in the region, and other indirect economic benefits (e.g., taxes, sales/revenue, and other fiscal effects to the regional and local communities)." This needs to be tied more directly to food, nutrition, and subsistence or moved from this section to HEC1 (SDH)	Revise paragraph	This sentence was moved to HEC 1.
ADHSS/DPH/SOE	35	K4.10.2.4	"Although these adaptive approaches would likely sustain harvest levels for affected communities, they may increase expenses and time needed to harvest subsistence resources. ": In addition to	Include discussion of additional potential health impacts from adjustments to subsistence harvest activities	Additional discussion on potential health impacts to subsistence was added, including increased stress and anxiety from adjustments to subsistence harvest activities.

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			expense/time, there could be increases in stress, accidents/injuries from potentially using unfamiliar harvest areas, and decreased availability of other resources		
ADHSS/DPH/SOE	36	K4.10.2.4	"Once constructed, the transportation corridor roads and the natural gas pipeline right-of-way could have a positive effect on access to subsistence resources (depending on the level of access agreed to between the State, PLP, and the LPB); because these cleared routes could facilitate overland travel by all-terrain vehicles and snow machines. The ferry could also facilitate access to subsistence resources by transporting local residents and their vehicles across the lake. PLP would work with local communities to find solutions for ferry transportation use (PLP 2018-RFI 027). Under the summer-only ferry operations variant, the ferry would not impact cross-lake local transport." This has a lot of other implications, which should be addressed in other HECs, such as accidents and injuries. Also, these statements contradict other HECs, which needs to be addressed	Clarify whether roads, ferries, etc. will be potentially available for public use. If so, this also needs to be addressed in other HECs, especially accidents/injuries, infectious disease, SDH	Clarification was added that although public access to the transportation corridor roads are expected to be restricted, there is the potential for public use of project roads and ferries by the public (beyond the planned road crossings) depending on the level of access agreed to between the State, PLP, and the LPB.
ADHSS/DPH/SOE	37	K4.10.2.4	The paragraph starting with "The evaluation presented in Section 4.9 Subsistence..." seems to imply that roads, ferries, etc. may be used by the public. This could decrease availability of subsistence resources, as there may be more pressure from hunters, especially if workers can also use the locations for hunting. If employees are prohibited from hunting/fishing/etc. in the area, that needs to be mentioned. This	Add clarifications and additional information relating to the interactions of public/workers on features of the project transportation corridor and the potential impacts to subsistence resources due to increased competition	Additional discussion was added on health impacts to subsistence. Clarification was added that although public access to the transportation corridor roads are expected to be restricted, there is the potential for public use of project roads and ferries by the public (see response above).

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			needs to be clarified and expanded upon.		
ADHSS/DPH/SOE	38	K4.10.2.4	Actual/perceived decrease in salmon quantity in Bristol Bay , impacts to commercial fisheries, and related impacts to human health should be addressed in this HEC and also in SDH (as many people in the broader PACs are also impacted by this)	Add discussion of actual/perceived decrease in salmon quantity in Bristol Bay, as well as impacts to commercial fisheries. Also add to SDH	Additional discussion was added on health impacts to subsistence, including impacts to fish populations and impacts to salmon resources.
ADHSS/DPH/SOE	39	K4.10.2.4	Food security should be discussed in greater detail in this summary of the HEC. Positive and negative effects are possible. Also, as mentioned in a previous comment, cost of living does not equal food security. There are other components to food security and these should be mentioned (for example, access to resources)	Add discussion of food security as a separate potential health impact	As requested, food security was added as a separate potential impact.
ADHSS/DPH/SOE	40	K4.10.2.4	Food cost and food security should be considered separately	Rate/rank food cost and food security separately (add new row for this potential impact)	As requested, food security was added as a separate potential impact.
ADHSS/DPH/SOE	41	K4.10.2.4	Edits needed to "potential impact of increased food security (expressed as a cost of living)". Food security may also decrease and food security isn't merely an issue of cost of living.	Suggested edit: potential impact of <del>increased</del> change in food security ( <del>expressed as a cost of living</del> )	As requested, food security was added as a separate potential impact.
ADHSS/DPH/SOE	42	K4.10.2.4	In a new row for "change in food security", this potential impact is +/- and should be rated appropriately	Acknowledge that food security may increase or decrease, depending on multiple household factors	As requested, food security was added as a separate potential impact (both negative and positive).
ADHSS/DPH/SOE	43	K4.10.2.4	Row of subsistence access/quality/quantity: Magnitude is better represented as a 1 or 2 instead of 0. Throughout the EIS, there is reference to impacts such as decreased access to subsistence resources, impacts to subsistence because of noise, etc. These	Revise row with increased magnitude of potential impact	Magnitude of potential impacts was revised to a 1 for construction and operations phases.

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			are factors which could result in impacts that individuals/households will need to adapt to in order to ensure they have adequate subsistence resources for food/cultural activities/etc. This will be particularly evident in households which will not benefit from employment and cannot as easily supplement smaller subsistence harvests with store-bought foods		
ADHSS/DPH/SOE	44	K4.10.2.4	Row of subsistence access/quality/quantity: Health effect for transportation corridor (T) should be 1 instead of 0. Throughout the EIS, there is reference to impacts such as decreased access to subsistence resources, which could impact communities with traditional use of land within the transportation corridors for subsistence activities	Revise row with increased health effect rating for transportation corridor	Health effect ratings were revised: mine construction and operations phases were increased to a 2, while transpiration, pipeline and port were increased to a 1 for construction and operations phases.
ADHSS/DPH/SOE	45	K4.10.2.4	Row of subsistence access/quality/quantity: Geographic extent for construction and operations may be better represented as 2 (community-level) rather than 1 (limited to households), given the high levels of sharing harvests with other households, and also given the detailed potential impacts in Section 4.9 Subsistence for each of the 6 PACs in closest proximity.	Revise row with increased geographic extent for construction and operations	As requested, the geographic extent was revised to a 2 for construction and operations phases.
ADHSS/DPH/SOE	46	K4.10.2.7	The Chronic Disease Impacts from Exposure to Hazardous Chemicals section does not discuss the hazards posed by exposure to metals through subsistence foods (after bioaccumulation/biomagnification). Chronic exposure to heavy metals is linked to a number of neurodegenerative disorders in adults, and neurobehavioral disorders in	Recommend discussing potential impacts on the incidence of neurodegenerative disorders in adults (e.g., Parkinson's Disease, Alzheimer's, ALS) and neurobehavioral disorders in developing fetuses and children to this section.	A table listing the potential health effects for metal COPCs was added to the Anticipated Project Sources and COPCs header in Section K4.10.2.3. The table is comprehensive but concise in listing the key health concerns related to all COPCs considered in the Health Section. The purpose of

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			babies and children. Subtle effects on cognition and behavior can occur at lower developmental exposure concentrations than previously thought, so it's important to provide these subsistence communities with all available information.		<p>this table is to provide an overview of possible health concerns for "lay readers", as discussed during the comments discussion call with ADHSS.</p> <p>Detailed discussion of potential impacts on chronic disease from neurodegenerative/neurobehavioral disorders was not added to this section for 2 reasons: 1) it would be difficult to tie in any changes to these disorders given the minimal baseline data (i.e., Dillingham Census Area and Bristol Bay Region Alzheimer's/dementia baseline data) and the estimated negligible increases of metals from the project. 2) The current Health Section does not include a more detailed or quantitative dose-response assessment or risk assessment for the COPCs, due to the minimal nature of the expected changes in environmental media from baseline concentrations. However, a summary discussion of multi-media exposures to mercury was added since this is a COPC of high concern to stakeholders.</p> <p>Additionally, to further address stakeholder concerns, recommendations for more quantitative monitoring have been included, in addition to the existing qualitative/semi-quantitative health</p>



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					evaluation. In the HEC 7 summary, text was added: "Consideration of monitoring of key metrics related to food availability and affordability is recommended to avoid negative impacts on chronic disease and long-term health status. Monitoring of exposure to project-related hazardous chemicals in dietary media may be considered to address uncertainties in exposure and use assumptions."
ADHSS/ DPH/SOE	47	K4.10.2.5	"PLP would likely conduct worker code of conduct training, and implement a closed work camp and workforce health education programs that would promote awareness of infectious diseases and preventive measures. The project would likely provide a place where workers who have infectious diseases (of any kind) could be diagnosed and treated, and measures would be taken to avoid transmittal of diseases to others." This would indeed help prevent transmission of infectious disease. Consider adding this as a mitigation or highlighting in EIS as a best practice	Add as a mitigation	In the Summary for HEC 5, development and implementation of health education and training programs to avoid and minimize the spread of infectious diseases is recommended as a best practice.
ADHSS/ DPH/SOE	48	K4.10.2.5	Mention somewhere in this section whether the worker camps are expected to be closed camps or not, who is allowed access on roads, etc. This has implications for potential infectious disease impacts.	Add additional workforce information	Additional text was added to the end of this paragraph: During project construction, operations, and closure, public access to or through the mine site would be restricted for safety, which would include the mine site worker camp, further reducing the potential for transmission of infectious disease into or out of the worker camps. This would also be true of the

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					worker camps planned for the transportation, pipeline, and port facilities."
ADHSS/DPH/SOE	49	K4.10.2.7	Row of increase in infectious disease, geographic extent column: Change the word partners to household. Families could also be impacted	Edit geographic extent wording of this row	The suggested edit was made.
ADHSS/DPH/SOE	50	Figure K4.10-1	Suggest evaluating adults and embryos/infants/children separately under human receptors due to differential toxicity/sensitivities. There are also additional, significant routes of exposure for these populations; most notably, maternal transfer. This should be included as an exposure route for babies/young children in this figure, and others where appropriate.	Suggest modifying figure to include adults, and embryos/infants/children as separate human receptor categories. Add maternal transfer as an exposure route.	The CSM figures were modified to clarify that both adult and child receptors were evaluated, but they are not listed as separate receptors in the CSM. Clarification text was added to HEC 3 section regarding differences in human receptors (adult and child) and bioaccumulative/biomagnification metal impacts to adults and sensitive sub-groups such as children, infants, nursing mothers, etc.
ADHSS/DPH/SOE	51	Figure K4.10-2	Suggest evaluating adults and embryos/infants/children separately under human receptors due to differential toxicity/sensitivities. There are also additional, significant routes of exposure for these populations; most notably, maternal transfer. This should be included as an exposure route for babies/young children in this figure, and others where appropriate.	Suggest modifying figure to include adults, and embryos/infants/children as separate human receptor categories. Add maternal transfer as an exposure route.	The CSM figures were modified to clarify that both adult and child receptors were evaluated, but they are not listed as separate receptors in the CSM. Clarification text was added to HEC 3 section regarding differences in human receptors (adult and child) and bioaccumulative/biomagnification metal impacts to adults and sensitive sub-groups such as children, infants, nursing mothers, etc.
ADHSS/DPH/SOE	52	Table K4.10-14	Recommend adding neurological diseases to Alternative 1 and variants column (and	Recommend adding neurological diseases to Alternative 1 and	Potential impacts on chronic disease from

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E			other similar figures). Suggest including language addressing differential risk (if any) for sensitive populations.	variants column. Suggest including language addressing differential risk (if any) for sensitive populations.	neurodegenerative/neurobehavioral disorders were not added to the table (see prior response on this topic). However, in the HEC 7 summary, text was added: "Consideration of monitoring of key metrics related to food availability and affordability is recommended to avoid negative impacts on chronic disease and long-term health status. Monitoring of exposure to project-related hazardous chemicals in dietary media may be considered to address uncertainties in exposure and use assumptions."
ADHSS/ DPH/SOE	53	K4.10.2.7	Increase in cancer...hazardous chemicals row: Edit likelihood rating for mine-- currently has missing numbers	Revise likelihood rating (fix error)	This typo was corrected.
ADHSS/ DPH/SOE	54	Table K4.10-11	Recommend adding neurological diseases to potential impacts row. Suggest including language addressing differential risk (if any) for sensitive populations.	Recommend adding neurological diseases to potential impacts row. Suggest including language addressing differential risk (if any) for sensitive populations.	Potential impacts on chronic disease from neurodegenerative/neurobehavioral disorders was not added to the table. See responses above regarding neurodegenerative/neurobehavioral disorders.
ADHSS/ DPH/SOE	55	K4.10.2.8	Comments on impacts to routine healthcare could be supported with examples, such as with data from Red Dog	Consider adding additional detail	Comment noted. Other projects as examples were not added because they are not necessary to inform the process or make project decisions.
ADEC	56	K4.10.2.1	It is not clear why the Pebble project's drug and alcohol workplace policy is being discussed here. Prior discussions have	Please explain.	Clarification was added that worker training would likely promote the safety culture outside of standard

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			focused on health impacts "outside the fence", but this one appears to address issues inside the fence.		work operations as well (i.e., "outside the fence").
ADEC	57	K4.10.2.3	Bullet three on this notes that "The far-field impact assessment concluded that AQRVs would not likely be affected at any of the PSD Class 1 or federal PSD Class II areas." It is not clear why federal Class II areas were included in this sentence since regulatory protections for Air Quality Related Values (AQRVs) only exist for Class I areas, such as national parks.	Please explain.	The Air Quality pathways sections underwent substantial revisions. This is no longer stated.
ADEC	58	K4.10.2.3	Paragraph one on this pages notes that "With implementation of the mitigation measures for idling and dust suppression, dust/PM would not be expected to exceed the annual PM thresholds and further reduce the ratio of estimated near-field concentrations for all project components to below AAQS." Without a specific citation to the mitigation measure for idling and dust suppression, how are we to know whether they will be able to reduce the dust/PM?	Please list the mitigation measures or cite to where they can be found.	The Air Quality pathways sections underwent substantial revisions. Citation to mitigation measures was added.
ADEC	59	K4.10.2.3	Bullet one on this page notes that "PLP expects a 35-foot wide buffer zone on either side of the transportation corridor to be impacted by snow plow spray, gravel spray and road dust." It is not clear where this 35-foot buffer was arrived at. A number of recent EISs on the North Slope have noted that "the passage of vehicle traffic over gravel pads, roads and airstrip would result in a gravel spray, dust shadow with measureable impacts on soil, vegetation and permafrost extending out to 300 feet from the edge of the gravel feature." The	Please explain why a 35-foot buffer is being used.	The Air Quality pathways sections underwent substantial revisions. This text was deleted. However, clarification and further discussion on the area of impact adjacent to roads was added in the HEC 3 subsistence pathway discussion.

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			discussion of fugitive dust impact on wetlands on page 4.22-19 notes that a potential indirect impacts area was calculated using a 330-foot buffer on all permanent road footprints.		
ADEC	60	K4.10.2.3	Bullet two on this page notes that "PLP would follow an idling policy, such as not allowing haul trucks to idle for more than a set amount of time if the vehicle or equipment is not in motion, which would reduce fuel consumption and reduce vehicle exhaust emissions, including PM." It is not clear how non-enforceable BMPs can be used as mitigation measures so that dust /PM would not exceed the annual PM thresholds.	Please explain.	The Air Quality pathways sections underwent substantial revisions; annual PM is not expected to exceed AAQS or permit thresholds. The referenced bullet is no longer listed in this section.
ADEC	61	K4.10.2.3	Bullet three on this page notes that "A fugitive dust control plan (FDCP) would be developed by PLP for mitigation and control of project activity related fugitive dust and wind erosion." Since this fugitive dust control plan has not been written and there is no discussion of which agency would be responsible for compliance and enforcement, it is not clear how this can be used as a mitigation measure so that dust /PM would not exceed the annual PM thresholds.	Please explain.	The Air Quality pathways sections underwent substantial revisions; annual PM is not expected to exceed AAQS or permit thresholds. The FDCP is expected to further reduce fugitive emissions.
ADEC	62	K4.10.2.3	Paragraph two on this page notes that "With effective dust mitigation measures, the potential air exposure pathways for the project would be insignificant." It is not clear how this conclusion was reached. The department's experience with the Red Dog Mine was that extensive measure have been required to limit the impacts of fugitive	Please explain.	The Air Quality pathways sections underwent substantial revisions; emissions are not expected to exceed AAQS or permit thresholds. This sentence was modified to state that with implementation of dust mitigation measures, the potential fugitive dust impacts from

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			dust on the surrounding vegetation and subsistence resources.		the project would be further reduced.
ADEC	63	K4.10.2.3	Paragraph six on this page notes that "three metals (arsenic, chromium, and copper) have baseline concentrations above the selected human health comparative action levels (CALs)...." but would result in "negligible increased cancer risk or hazard...." It is not clear how this conclusion was reached without providing the reader with the baseline concentrations and the selected human health comparative action levels. Time frame is also relevant to the discussion, as it is not clear from the text if the model prediction is based off end of life or a yearly increase. Please also note that DEC has released a technical memorandum regarding evaluating metals at contaminated sites in August of this year that may inform this discussion. This guidance can be found at <a href="https://dec.alaska.gov/spar/csp/guidance-forms/">https://dec.alaska.gov/spar/csp/guidance-forms/</a> and then enter "metals" in the search box.	Please provide the baseline metals concentrations outside the fence area and the predicted increase in concentrations expected. The percent increase provided from a model is dependent on the starting value. Please provide the time frame used in the model calculations. It also should be noted in this discussion that the default particulate emission factor that is incorporated in the ADEC soil method 2 inhalation pathway does not capture the increase in dust generation or incorporate any subsistence pathway. This discussion also need to answer two questions. (1) Will mining activities cause arsenic to migrate? and (2) Will mining activities concentrate arsenic?	Comment noted. In order to maintain document-wide consistency, this HIA does not repeat detailed information presented in other EIS sections. Please see the Table 4.14-1 in Soils, Section 4.14, which presents the soil baseline mean, incremental increase from mine operations (20 yrs.), end of mine life soil concentration (baseline + 20 yr. dust deposition), and screening against CALs.  Clarification was added to Section K4.10.2.3 that the future soil concentrations are representative of end of mine operations (baseline + 20 yrs. dust deposition).
ADEC	64	K4.10.2.3	Paragraph three on this page appears to conclude that post-closure monitoring will indicate that water quality meets the approved criteria for discharge without treatment at approximately 50 years post closure. It is not clear how this conclusion can be reached without a detailed discussion of water treatment.	Please provide additional details.	Comment noted. As noted in this paragraph, these findings are from Water and Sediment Quality, Section 4.18. In order to maintain document-wide consistency, the EIS minimizes repetition of detailed information sourced from other EIS sections.
ADEC	65	K4.10.2.3	Paragraph one on this page notes that "Without vegetated cover and food resources, birds are not likely to be attracted to the TSF. The open pit lake	Please provide additional details that would substantiate the document's conclusion.	This text was updated based on the updated information sourced from Wildlife Values, Section 4.23. Overall, bioaccumulation potential

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			would be deep, contain no shallow water habitats, and lack freshwater vegetation, but some waterfowl may use it during open water months. Based on this, migratory waterfowl would not be expected to have substantive exposure to the mine site water storage features." It is not clear how this conclusion was reached when there have been repeated incidents of waterfowl deaths at the Berkeley Pit, a former open pit copper mine in Butte, Montana		is expected to be low for migratory waterfowl, because they would not be expected to have sufficient exposure to the mine site water storage features, including the pit lake. Impacts to wildlife from all aspects of the project, including around the pit lake, would be minimized or mitigated through PLP's development and implementation of a Wildlife Management Plan (WMP). See the updated discussion under waterbirds in Section K4.10.2.3 for further details.
ADEC	66	K4.10.2.3	Paragraph four on this page cites to 18 AAA 31. This citation is incorrect as the Alaska Administrative Code is abbreviated at AAC	Please correct this citation.	The typo was corrected.
ADEC	67	Figure K4.10-1	Footnote five on this figure notes that "Mine site dust deposition modeling and estimated media impacts indicate that increases would be negligible, with increases of <3.2% for antimony and <1% for all other metals." It is not clear how this conclusion was reached. The department's experience with the Red Dog Mine was that extensive measures have been required to limit the impacts of fugitive dust on the surrounding vegetation and subsistence resources.	Please explain.	The following citation was added to the footnote: See the soil exposure pathway discussions in Section K4.10.2.3, as well as Soils, Section 4.14.
ADEC	70	Figure K4.10-2	Footnote six on this figure notes that "Since air emissions would be expected to meet permit requirements and/or air quality standards and dust deposition would not be expected to increase metals concentrations above baseline, impacts to wild foods	Please explain.	The following citation was added to the footnote: See the air, soil, water, and subsistence exposure pathway discussions in Section K4.10.2.3. Also see Air Quality, Section 4.20; Soils, Section 4.14;

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			above baseline would not be expected (i.e., insignificant)." It is not clear how this conclusion was reached. The department's experience with the Red Dog Mine was that extensive measures have been required to limit the impacts of fugitive dust on the surrounding vegetation and subsistence resources.		Water and Sediment Quality, Section 4.18; and Subsistence, Section 4.9.