State of Alaska Comments – Pebble Project Preliminary Draft EIS, Section 4.15 – Geohazards

Agency	Comment No.	Section, Paragraph, and Page #	Cooperating Agency Comment (and Purpose of Comment)	Proposed Resolution (Additions or Deletion of Text)	Response
ADF&G (comm fish/ Homer)	Excel line 112	4.15	In various locations throughout this Geohazards chapter, it refers the reader to the "Spill Risk" section, which is sometimes referenced as being Section 4.21 and sometimes Section 4.27. Section 4.21 is a 2-page "Food and Fiber" section with no mention of spill risk and Section 4.27 was not provided for agencies to review. Access to this section is needed to review how the DEIS assesses the risk of spills associated with various project components and proposed mitigation measures.	Provide Section 4.27 and allow sufficient time for Cooperating Agencies to review.	The review draft version of Section 4.27, Spill Risk, was delivered on schedule to USACE on December 21, 2018. This section had a later review due date than other review draft sections, because the information critical to this section was determined during the FMEA workshop held in late October 2018, and there was a period of required modeling and analysis involved after the workshop completion. While the review draft version of Section 4.27, Spills, was distributed to cooperating agencies on December 23, 2018, and comments were requested back by January 7, 2018. Note that ADF&G was not identified as an agency having special expertise in that section by the USACE (for the State of Alaska, Alaska DEC was identified). Comments received from non-identified agencies would be considered during the DEIS scoping period. Text now accurately cross references Section 4.27, Spill Risk.
ADF&G (comm fish/ Homer)	Excel line 113	4.15.2.3	Given the uncertainty in the predicted run-up elevation estimate of 34.8 MHW (see comment for section 3.) it is difficult to conclude if the 28 ft. MHW design height of the terminal patio is adequate. Even if the run up elevation estimate were accurate, it would still be ~ 7 ft. above the terminal patio. Given the amount of infrastructure, volume of fuel storage, size of concentrate storage, etc. the proposed port facility should have an additional safety factor built into the design to	Designing for maximum inundation elevations should be done and include additional elevation as a safety factor given the level of risk.	Return period “time horizons” represent different size tsunamis with different likelihoods of occurrence. The 2,500-yr return period event is the “maximum considered tsunami” in the latest industry standards, ASCE 7-16, within which certain risk category structures should be designed such that they are able to provide essential functions immediately following the event (ASCE 2017a). Text has been added to clarify this. Text also added (based on PLP 2018-RFI 112) describing detailed tsunami analysis that would be conducted prior to final port design in accordance with ASCE (2017a) standards, including a probabilistic assessment of tsunami sources and numerical modeling to provide site-specific

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			accommodate for tsunami events. The selection of 100 - 500 vs 2,500 time horizons is arbitrary.		maximum runup and inundation that would be incorporated into final design. The final terminal elevation would be revisited in final design based on these analyses.
ADF&G (comm fish/ homer)	Excel line 114	4.15.2.3 (with references to Section 3.15.5)	In the Tsunami section, it discusses the runup elevations that would be expected under various size earthquake events and indicates that the elevation of shore facilities associated with the port (including diesel storage tanks) would be sufficient (28' above mean sea level [amsl]) to withstand a medium-large earthquakes (~15-23' amsl) but not a very large earthquake (35' amsl). The potential for damage to infrastructure (including fuel tanks) stemming from tsunami events greater than 28' amsl is acknowledged, but the risk is rated very low over the life of this project (which they did not specify as 20 or 78 years) and Section 4.27 (the Spill Risk section) was not available for review. Also, in Section 3.15.5 (Tsunamis, Seiches, and Coastal Hazards) of the previous chapter, it indicated that the 1883 eruption of Augustine Volcano produced a wave that affected areas up to 55' above high tide. Given that the port pad will be only 28' amsl, a similar event would very likely destroy the fuel tanks at the port, releasing up to 5 million	Provide Section 4.27 and allow sufficient time for Cooperating Agencies to review. Also, recommend design change to increase the elevation of the port pad to 55' above high tide so there's a better chance of the fuel tanks withstanding a tsunami wave generated by a major landslide on Augustine volcano.	See response above for "Excel line 112" regarding Section 4.27, Spill Risk. Text has been added to include analysis of landslide-generated tsunamis from Augustine, as well as detailed tsunami analysis that would be conducted prior to final port design (PLP 2018-RFI 112). In accordance with ASCE (2017a) standards, probabilistic tsunami hazard assessment and numerical modeling would consider both earthquake- and landslide-generated events to provide site-specific maximum runup that would be incorporated into final design. The final terminal elevation would be revisited in final design based on these analyses. The port diesel fuel facility would be designed to withstand the 2,500-year event, and the concrete containment barrier wall around the fuel tank farm would be designed to protect against tsunami runup.

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			gallons of fuel into the environment.		
ADF&G (comm fish/ homer)	Excel line 115	4.15.2.3	Augustine volcano is said the be the most historically active volcano in the Cook Inlet region (Miller et al 1998) and it's estimated that as many as 12-14 debris avalanches have reached the sea in the last 2000 years (Waythomas et al 2006). Known flow paths of historical debris avalanches extend in all directions around Augustine volcano including toward Amakdedori Port and the 2 proposed lightering locations (Waitt et al 1996). One of the avalanches that occurred 300 – 500 year ago on the western side, generated a wave with maximum amplitude of up to 49.2 ft. that struck the mainland shore. This same wave generated a secondary wave with maximum amplitude of 62 ft. This happens to be at proposed lightering location 1. The DEIS dismisses these risks as unlikely to occur in the project's life given that the estimated historical occurrence has been every 150 to 200 years on average.	Given the 78-year projection (RFFAs) , a thorough analysis should be undertaken of this assessment due to the amount of infrastructure, volume of fuel storage, size of concentrate storage, etc. the proposed port facility. Amakdedori Port should be engineered to an elevation above the historical estimates of maximum wave heights from debris avalanches at Augustine volcano and include an additional elevation safety factor given the level of risk. Specifics on how lightering and cargo ship operations would be engineered to withstand these effects should be included.	The cited references regarding past Augustine activity, debris avalanches, and estimated tsunami waves have been analyzed and added to Section 3.15, Geohazards (Chapter 3, Affected Environment). Text has been added to Section 4.15, Geohazards (Chapter 4, Environmental Consequences) to describe detailed tsunami analysis that would be conducted prior to final port design (PLP 2018-RFI 112). In accordance with ASCE (2017a) standards, probabilistic tsunami hazard assessment and numerical modeling would consider both earthquake- and debris avalanche (landslide)-generated events to provide site-specific maximum runup that would be incorporated into final design. The final terminal elevation would be revisited in final design based on these analyses (PLP 2018-RFI 112). Text also added to 4.15, Geohazards (Chapter 4, Environmental Consequences), to describe effects on lightering operations. Text has been added to the cumulative effects subsection of Section 4.15, Geohazards (Chapter 4, Environmental Consequences, to describe the probability of occurrence over the life of the project, and the increase in probability for the 78-year expanded mine scenario.