

June 18, 2019

Shane McCoy
Program Manager
US Army Corps of Engineers
645 G Street
Suite 100-921
Anchorage, AK 99501

Subject: Pebble Mine Draft Environmental Impact Statement Summary Comments

Dear Mr. McCoy,

Based on a careful review of the Pebble Mine Draft Environmental Impact Statement (DEIS), it is my professional opinion that the document and associated analysis is fatally flawed.

The DEIS contains an unacceptable number of deficiencies, omissions and errors for such a large, complex project in an extremely sensitive environment. Due to the global significance of the salmon fishery, any EIS within the Bristol Bay watershed should be held to the highest standard, but the Pebble DEIS does not even meet industry standard practice. I would strongly urge the Army Corps of Engineers to restart the DEIS process with an analysis based on an economically-credible mine plan, supported by an independent and rigorous economic analysis demonstrating that it is the “least environmentally damaging practicable alternative” (LEPDA).

This conclusion is based upon my more than thirty years of experience as an environmental and permitting specialist in the mining and consulting industries. Flaws in the DEIS are detailed in five separate comment letters from Richard K. Borden to the Army Corps of Engineers dated March 4, March 28, May 13, May 31 and June 17, 2019. This final letter provides an integrated overview of my concerns, without superseding any of the specific comments contained in these earlier letters.

The 20-year mine plan evaluated by the DEIS is almost certainly not economically feasible and therefore does not represent the least environmentally damaging practicable alternative for analysis. If the 20-year mine was constructed it is almost certain that a much larger mine would ultimately be developed in an attempt to attain a positive rate of return on a very large and risky initial investment. However, the cumulative effects evaluation of the more-credible 78-year mine plan significantly understates and, in some cases, grossly underestimates the much larger impacts and risks associated with an expanded mining operation. There are also several important alternatives which could significantly reduce the environmental impacts and risks of the project which were either not evaluated or were eliminated prematurely.

Much of the analysis contains insufficient detail to determine if the planned actions are adequate or practicable; the DEIS commonly understates potential impacts; essential analyses and designs are deferred to the post-EIS permitting period; and in a number of significant instances, the conclusions are clearly wrong. The analysis of key project components such as water management, geotechnical stability, reclamation & closure, wetlands mitigation and air quality are clearly inadequate. In particular the failure to consider the profound impacts that would result from large-scale catastrophic tailings dam failure means that the DEIS ignores one of the largest environmental risks posed by the project. The DEIS was completed in less than half the time typical for other mining projects, so it is unsurprising that it bears many of the hallmarks of an overly rushed process.

The DEIS as it is currently written cannot support the statement that “measurable impacts to salmon populations would be unlikely”. The smaller mine will likely result in lesser impacts if everything goes exactly according to plan, but this is unlikely given the complexity of, and very high risks posed by, the proposed development. However, the expanded mine scenario is certain to lead to measurable, significant and permanent harm to fisheries in the Bristol Bay watershed. If a large-scale failure of tailings containment were to occur under either mine scenario, the fish values throughout the Kuktuli/Nushagak River system would almost certainly be profoundly and permanently damaged.

Given the substantial flaws in the DEIS, I would strongly urge the Army Corps of Engineers to restart the process with an analysis based on an economically-credible mine plan, supported by an independent, rigorous economic analysis demonstrating that the project is the least environmentally damaging practicable alternative. The EIS process will be severely compromised if the deficiencies of the current document are not fully addressed; this would almost certainly require, as a minimum, the completion of a Supplemental Environmental Impact Statement, recirculated in draft for public comment.

Professional Background

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.

Project Economics

The 20-year mine plan being evaluated by the Pebble Mine EIS process is almost certainly not economically feasible. It only targets about ten percent of the total resource 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). Based upon an independent analysis of project economics, the mine plan being evaluated by the DEIS has been estimated to have a net present value of roughly negative three billion dollars (Borden, 28 March). Furthermore, the closure of even this relatively small mine is almost certain to cost in excess of 1.5 billion additional dollars (Borden, 31 May). The conceptual financial analysis for the 20-year mine plan provided in the DEIS is fatally flawed. It ignores smelter and refining costs, understates capital and operating costs and fails to provide even a placeholder cost for closure. With the incorporation of just these limited corrections, the Pebble Limited Partnership financial evaluation also has a strongly negative net present value. The DEIS is thus evaluating a mine plan that does not meet its own alternatives screening criteria including the requirement that each alternative be “practical or feasible from the technical and economic standpoint”.

If the base case mine plan assumed for the EIS is not economic, then the entire permitting process is compromised because the impacts and risks being evaluated are much smaller than those that would be required for a full-scale economically viable project. In other words, the EIS is not evaluating the “least environmentally damaging practicable alternative”. Even a relatively small expansion of the current plan to match the smallest scenario evaluated by Wardrop (a 25-year mine) would more than double most environmental impacts and would increase geochemical/water quality risks by a factor of four.

Cumulative Effects Analysis

The cumulative effects analysis for the expanded mine case evaluated in the DEIS contains insufficient detail, understates the impacts of a larger mine and in some cases its conclusions are clearly wrong. Most of the individual impacts and risks for the 78-year mine will be at least three to seven times greater than for the small 20-year mine (Borden, 17 June). However, the geochemical and water quality risks posed by the larger mine will be at least ten times greater. The mine would also need to manage five times more tailings and one hundred times more waste rock with an associated increase in the risk of catastrophic containment failure. It is certain that this larger mine would lead to measurable, significant and permanent harm to fisheries in the Bristol Bay watershed even if everything were to go according to plan.

Geotechnical and Spill Risks

Given the very high innate geotechnical risk of the Pebble Mine setting and the extreme sensitivity of the downstream receiving environment, the DEIS analysis of tailings and untreated water release is clearly inadequate (Borden, 13 May). The DEIS fails to definitively demonstrate the geotechnical stability of tailings embankments, water storage facilities and pit walls throughout operation and closure.

Large-scale catastrophic release of tailings and contact water is one of the most significant risks posed by the Pebble Project and the DEIS’ intentional failure to evaluate the impacts of any

catastrophic release events cannot be justified. By ignoring all potential catastrophic failure events, the release scenarios evaluated by the DEIS are anomalously small, representing only 1) 0.004% of produced bulk tailings that must be contained on-site forever; 2) 0.6% of produced pyritic tailings that must be contained on-site during operation; and 3) 0.4% of untreated process water that must be contained on-site during operation. Even a release of just five percent of the bulk or pyritic tailings is likely to have profound, permanent negative impact on downstream aquatic ecosystems and fisheries.

Reclamation and Closure

Despite the significant post-operational environmental impacts and risks at Pebble, no Reclamation and Closure Plan has been completed and the closure analysis within the DEIS is clearly inadequate (Borden, 31 May). The lack of even a conceptual level plan is a particular concern because closure of the 20-year Pebble mine will be complex and very costly (almost certainly exceeding 1.5 billion dollars). Water treatment for flows in excess of 5000 gallons per minute will likely be required for centuries after mining is completed. Completion of a Reclamation and Closure plan during the EIS process is common practice within the mining industry. A pertinent recent example is the Donlin Gold Project in Alaska, whose EIS was led by the Army Corps of Engineers, which completed a 458-page plan with a detailed cost estimate during its EIS process.

There are a large number of closure-related omissions, errors and uncertainties within the DEIS and its supporting documents that make it impossible to assess long-term impacts and risks, or even to determine if the proposed closure strategies are practicable. Key problem areas include: topsoil management, revegetation strategies and goals, reclamation of quarries, infrastructure demolition, bulk tailings storage facility (TSF) recontouring, bulk TSF cover design, bulk TSF runoff structure design, embankment recontouring to re-establish drainage, embankment seepage management, water treatment plant practicability and perpetual water management infrastructure.

Wetlands Mitigation

Mitigation actions at Pebble will be critically important given the project's unavoidable, permanent large-scale impacts to an extremely sensitive and economically valuable receiving environment. Unfortunately, many of the actions presented in the DEIS are so poorly-defined that it is impossible to assess if they would provide adequate and meaningful mitigation for the project's impacts (Borden, 17 June). For example, the DEIS states that "The project would propose fish habitat mitigation measures to enhance or create new habitat outside of the immediate project footprint". However, no actual potential mitigation projects are identified in the DEIS or in the Draft Conceptual Compensatory Mitigation Plan (CMP) (Appendix M). Instead the CMP only discusses generic evaluation criteria for the selection of currently unidentified mitigation projects to be identified at some future time. It will be exceedingly difficult for Pebble to find any meaningful mitigation projects of sufficient size within the Bristol Bay

watershed because it is an unimpacted pristine environment currently unthreatened by any large-scale development other than the Pebble Project itself.

Water Management

Given the very high geochemical risk of the Pebble orebody, 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 DEIS estimates that an average of 13,000 gallons per minute of water will require very costly and complex treatment during operation and up to 22,000 gallons per minute on average will need to be treated during closure. Under the 78-year mine scenario, the water management liability would increase to 40,000 to 65,000 gallons per minute on average near the end of mine life. I am not aware of a treatment flowsheet of this complexity being applied to such high flows anywhere else in the world. Many of the water management strategies and systems described in the DEIS are flawed or lack sufficient design detail to evaluate whether they are adequate and practicable to meet the required very high standard for water management (Borden, 17 June). Problematic water management issues include but are not limited to 1) water treatment practicability, 2) constructability and performance of water containment structures, 3) groundwater quality impacts, and 4) water treatment requirements during construction.

Air Quality Predictions

It appears that air quality dispersion modelling did not consider the impact of tailpipe (mobile) emissions on the surrounding airshed (Borden, 17 June). If tailpipe emissions from haul trucks and other mobile equipment have truly been omitted from the dispersion modelling, this represents a fatal flaw in the air quality predictions, particularly for nitrogen oxides (NOx). The DEIS emissions inventory indicates that 97% of all NOx emissions from the mine result from tailpipe emissions. Air quality impacts are likely to be much greater than currently implied by the DEIS and it may be much more difficult for the project to meet air quality standards than currently assumed.

Sincerely,

A handwritten signature in black ink, appearing to read "Rick Borden". The signature is written in a cursive, somewhat stylized font.

Richard K. Borden

Owner Midgard Environmental Services LLC

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