Southeast Alaska
Conservation Council

2207 Jordan Ave
Juneau, AK 99801
(907) 586-6942
www.seacc.org

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Juneau Ranger District
5810 Mendenhall Loop Road
Juneau, Alaska 99801
Transmitted via portal: sm.fs.greenscreek@usda.gov

Re: Comments on the Draft Supplemental Environmental Impact Statement (DSEIS) for the Greens Creek North Extension Project #57306

GLOSSARY OF ABBREVIATIONS:
ADEC–Alaska Department of Environmental Conservation
ANILCA–Alaska National Interest Lands Conservation Act
ANM–Admiralty National Monument
APDES–Alaska Pollutant Discharge Elimination System
AWQS or WQS–Alaska Water Quality Standards
BMP–Best Management Practices
DSEIS–Draft Supplemental Environmental Impact Statement
EFH–Essential Fish Habitat
EIS–Environmental Impact Statement
FWMP–Freshwater Management Plan
GPO–General Plan of Operations
HGCMC–Hecla Greens Creek Mining Company
HIMR–Hawk Inlet Monitoring Report
IMP–Integrated Management Plan
JRD–Juneau Ranger District
NEPA–National Environmental Policy Act
ROD–Record of Decision
SEACC–Southeast Alaska Conservation Council
SWMP–Stormwater Management Plan
TDF–Tailings Deposit Facility
USFS–United States Forest Service
WMP–Waste Management Permit

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1. Introduction

Based in Juneau, Alaska (Tlingit/Áak'w Ḵwáan lands), Southeast Alaska Conservation Council (SEACC) is a regional grassroots organization with over 7,000 supporters. For over 50 years, SEACC has been bringing together diverse Alaskans from our region's communities to protect the natural resources of Southeast Alaska, ensure sound stewardship of the lands of the region, and protect subsistence resources and traditional ways of life side-by-side with fishing, tourism and recreation.

Greens Creek Mine, located in Admiralty National Monument on the Tongass National Forest near Juneau, Alaska, has been in active operation since 1989. Greens Creek Mine is an underground hard-rock zinc, gold, silver and lead mine which uses a "dry-stack" tailings disposal method. Several Environmental Impact Statements (EISs) have guided its development and operations during that time, including:

- 1983 EIS
- 1988 Environmental Assessment (EA)
- 2003 EIS
- 2013 EIS

In March, 2023, the USDA Forest Service released the Greens Creek Mine North Extension Project Draft Supplemental Environmental Impact Statement (DSEIS) to provide for another potential expansion of the tailings disposal facility (TDF). The effect of the expansion alternatives in the document would extend Greens Creek Mine's operational life from between twelve to forty years. The most recent scoping process, initiated in 2020, identified familiar public concerns: fugitive dust and its effect on biological resources, water quality, wetlands, subsistence resources, and Admiralty National Monument values.[1]

SEACC submits these comments to express opposition to two of the alternatives as-written and to express our support for a more substantive proposed alternative, which would include a carefully developed, robust monitoring and mitigation plan for fugitive dust management as well as other potential cumulative effects of Greens Creek Mine's operations within Admiralty National Monument.

2. Alternative Selection

In the 2023 DSEIS, the Forest Service has identified Alternative B as the proposed alternative. This alternative includes:

[1] USDA Forest Service. *Draft Supplemental Environmental Impact Statement.* March, 2023.

- Relocation of the B-road to the east and extension of the tailings pile to the east, while maintaining the lease boundary and causing the least amount of new disturbance to the Monument as opposed to other alternatives (2.3 ac.).
- Extend life of mine by 12-18 years by allowing for an increase of the tailings stack footprint, but keeping the expansion within the existing lease footprint.

Alternatives C and D include relocation of the B-road to the west side of the tailings pile, expanding disturbance further into Admiralty Island National Monument, with the intention to occupy the area for a significantly longer period of time — up to forty more years, for Alternative D.[2] It is clear that the decision is not just about expanding a tailings facility, even though that is the topic of discussion and despite the fact that related issues were excluded from consideration in the DSEIS. Selection of alternatives C or D will mean that Greens Creek Mine would be allowed to operate in the Monument for up to forty more years. This is a huge decision, with huge impacts. SEACC believes that in this DSEIS the Forest Service is limiting or constraining the discussion to a degree, as if the expansion of the tailings facility is an isolated issue, without a "hard look" at the implications for the surrounding area of the Monument if an extension of the life of the mine is permitted.[3]

We urge the Forest Service to craft a Final EIS that comprehensively considers the direct, indirect, and cumulative anticipated environmental impacts for the increase in time that HGCMC will be operating as a result of any expansion, as required by 42 U.S.C. § 4332(C) and 40 CFR § 1508.1(g). SEACC is including information in this comment about lead accumulation and sources in Hawk Inlet because the nature and extent of this expansion will, in turn, allow Hecla Greens Creek Mining Company to continue to mine on Admiralty National Monument and continue to release more lead and other metals into the environment around the mine, particularly Hawk Inlet. The impacts associated with these alternatives will be greater across the board because of the nature of the expansion, including increased potential for fugitive dust releases with the increased height and footprint of the tailings disposal facility, and increased land disturbance and impacts to freshwater streams and watersheds in which the mine currently exists.[4] It must be pointed out that the mine was neither anticipated nor planned to have such a long life. Initially, it was projected that the mine would only operate for about a decade, which was one reason the mine chose the dry-stack tailings disposal method.[5]

[2] *Id.*
[3] 42 U.S.C. § 4332(C); 40 CFR § 1501.9(e)(1); 40 CFR § 1508.1(g).
[4] USDA Forest Service *DSEIS* 2023; *EIS and ROD* 2013.
[5] Condon and Lear. 2006.

It is important to track agency decisions associated with Greens Creek Mine over time, as it is crucial to monitor environmental impacts. In the 2013 EIS, the approving official expressed his belief that the primary focus of the public has concerns with "irreparable harm" in the Monument.[6] While debate may continue over whether or not Greens Creek Mine has caused irreparable harm to Admiralty National Monument to date, it is much more certain that with up to forty more years of operational capacity, it *will* cause irreparable harm in violation of ANILCA 503(i)(1)(B). For that reason, among others, SEACC opposes Alternatives C and D, both of which raise concerns under the standard in ANILCA 503(i)(1) because they allow for more expansion into the Monument, more associated environmental impact, and much more potential operating time.

The Forest Service has artificially constrained its analysis in the DSEIS in terms of evaluation of certain elements, including geotechnical stability. In limiting geotechnical analysis only to the TDF footprint, other infrastructure that will change due to any expansion is ignored. Due to the fact that the entire area is seismically active, this inappropriately constrains the scope of the analysis and underestimates the full extent of potential impacts. Additionally, by limiting discussion in this DSEIS and the 2013 EIS to the tailings disposal facility itself and thus limiting a discussion of cumulative impact caused by the mine's additional operational capacity and time of occupation as a result of an expansion, the Forest Service artificially constrains its evaluation, and any resulting discussion of cumulative impact is not comprehensive in terms of irreparable harm to the Monument.[7]

SEACC supports a modified version of Alternative B if certain conditions are met, including additional analysis to ensure compliance with ANILCA 503(i)(1) — as detailed in this comment for the record.

2.A. Cumulative Effects

The Forest Service only addresses cumulative effects as applied to the alternatives for the TDF expansion presented in the 2023 DSEIS. Under the current lease term, Greens Creek can legally operate in the Monument until 2095.[8] Continued incremental expansions do not relieve the Forest Service of the duty to study the entirety of the mine's operational impact on the Monument over time.[9] Operation and development of the mine until 2095 qualifies as a "reasonably foreseeable future action" under agency regulations. NEPA requires the Forest Service to consider reasonably foreseeable indirect and cumulative impacts of the proposed

[6] *Id.* at 12.
[7] 42 U.S.C. § 4332(C); 40 CFR 1508.1(g).
[8] 2013 EIS, Vol. II, Appendix A at A-120 and 121, Response to Comments JS.5.028.
[9] 40 CFR 1508.1(g).

action when it approves the proposed expansion of the TDF.[10] Table ES-2, risks to aquatic resources, are listed as low to moderate for all alternatives except D, which lists high impacts. SEACC categorically disputes that an accurate cumulative effects analysis has been performed, since baseline study data of the area has not yet been incorporated in comparisons of pre-and post-production conditions in Hawk Inlet.

2.B. ANILCA Title VIII — Subsistence Management and Use

The Alaska National Interest Lands Conservation Act (ANILCA) was created with the intent of preserving certain lands and waters in Alaska for present and future generations, and lands protected by ANILCA include Admiralty Island National Monument.[11] Section 810(a) requires that the Forest Service shall evaluate whether permitted uses, occupancy, or disposition of public lands will reduce or eliminate the use of lands needed for subsistence purposes. Section 808(a) also establishes a regional or local subsistence advisory commission, three members of which engage in subsistence activities in the Monument and provide input annually. Have three members of the closest rural subsistence advisory committee been providing annual reports on subsistence use in Hawk Inlet or near Greens Creek Mine? If so, SEACC has been unable to find that information.

Rural communities that have historically participated in subsistence activities in Hawk Inlet include Angoon, Hoonah, and Tenakee Springs, according to the 2023 DSEIS. In the 2013 EIS, current subsistence use in Hawk Inlet is described as mainly originating with users from private holdings in Wheeler Creek.[12] The 2023 DSEIS relies on ten-year-old subsistence data and characterizations from the 2013 EIS which may not be accurate and need to be updated at this point in order for the Forest Service to meet its ANILCA 810 requirements. Additionally, to the extent there are significant new circumstances or information relevant to environmental concerns related to subsistence, that information should be analyzed in the DSEIS.[13]

Regardless of the level of *current* subsistence use, the responsibility of the Forest Service to continue to assure that subsistence use can continue in this area is clear. A question that remains at issue is whether subsistence and other natural resources in Hawk Inlet have been impacted by Greens Creek Mine. As is evident from results of sediment monitoring and marine and fresh water monitoring and biomonitoring, the answer is undoubtedly yes.

[10] *See Edwardsen v. U.S. Dep't. of Interior,* 268 F.3d, 786 (9th Cir. 2001); 40 CFR §§ 1508.8(b), 1508.7.
[11] 2013 EIS. Appendix B.
[12] *Id.*
[13] 40 CFR 1502.9(d)(1)(ii).

3. Hawk Inlet

Hawk Inlet is approximately seven miles long and is separated from Chatham Strait, the larger water body, by a sill between the western shore and Greens Creek Delta. The inlet experiences up to a 25-foot tidal variation and is influenced by freshwater flow from Greens Creek and other streams.[14]

In the 2013 EIS, Hawk Inlet is described in terms of its importance for subsistence use. Subsistence use is characterized as "light and dispersed," while historically the heaviest use, according to the Forest Service, probably occurred during the cannery period, 1910-1976.[15] While such use has decreased with the cannery's closure in the mid-1970s, some subsistence use still occurs in Hawk Inlet. Hawk Inlet is described as a sacred place in terms of its importance to the Angoon community, which is the primary subsistence community in the area and is populated mainly by Alaska Native tribal members.[16] The historic importance of Hawk Inlet in terms of the community of Angoon was described clearly in 2013, along with compelling stories of community involvement from the period when the Monument was created. The cannery era is of great historic and cultural significance to residents, and many Angoon residents remember participating in summer-long subsistence activities in Hawk Inlet while they or a family member were employed at the cannery. Angoon is forty miles away from Hawk Inlet and today, many circumstances have influenced a decrease in subsistence use in the area, including worries about the influence of the mine on subsistence food sources.[17]

3.A. Hawk Inlet Monitoring Program

The monitoring program and annual report for Hawk Inlet should be re-evaluated and improved according to numerous recommendations from audits, information presented by the public, and the mine's own reports. There also appear to be issues with the Quality Assurance Project Plan (QAPP) and potentially one or more of the laboratories HGCMC uses to analyze inlet water column samples, as explained below.

Field blanks are defined as a control sample prepared in the field by filling a clean container with Type I water and appropriate preservative, if any, for the specific sampling activity being undertaken. In the 2021 HIMR, levels of dissolved lead were found in field blanks at levels that exceeded the Method Detection Limit (MDL), but were not reported. If field blanks have been this far out of balance with regard to MDLs, the data should have been flagged during validation, according to EPA guidance.[18] This issue has been ongoing since at least 2018. As

[14] 2023 DSEIS at 3-72.
[15] *Id.* at B-2.
[16] USDA Forest Service. 2013. *Environmental Impact Statement and Record of Decision, Vol. 1.*
[17] *Id.*
[18] *Id.* at 3.

SEACC has noted previously, there appears to be confusion between trip and field blanks as indicated from language in the reports.[19] No corrective action has been taken, and appropriate data flagging and validation has not occurred. This occurred at least twice during 2021 alone; once in Quarter 1 and again in Quarter 4 (p.7&8). In the first sample, concentrations in the field blank were detected at 2.10 times the MDL, although the report notes:

> "no corrective action was taken considering **this is below the reporting limit of 4 times the MDL** [emphasis added]."

In Quarter 4's field blank, dissolved lead was found at a level that was 7.16 times the MDL (p.8):

> "Zn and **Pb**, which were detected at **1.63 and 7.16 times the MDL** [all emphasis added], respectively. No corrective action was taken considering this is less than 10 times the MDL."

ADEC's explanation for this issue is as follows:

> *Hecla used two differen*[sic]*ce laboratories, Battelle Marine Science and ACZ Laboratories, to perform the Hawk Inlet water quality analysis during the year. MDLs and field blank thresholds for reporting may vary between laboratories due to differences in laboratory capability and internal QA/QC procedures. As mentioned earlier, the reporting level as a multiple of the MDL is based on lab-specific QA/QC protocol. I suggest contacting Battelle and ACZ directly for that information* (pers. comm., A. Nakanishi).[20]

If one lab's protocol results in a reporting threshold of four times the MDL, and another lab's protocol allows for ten times the MDL for lead before a reporting trigger is pulled, that in and of itself leads to questions about the validity of the analytical results. If those differences in the report are caused by laboratory changes, that should be noted and explained along with the MDL information. The confusion caused by poor reporting data and format must be resolved before any expansion alternative is approved by the Forest Service. It is inappropriate for HGCMC not to clarify that two laboratories, with potentially different reporting thresholds, were used for sample testing of the same element/s. This issue must be addressed for future reports.

[19] *HIMR* 2019 at 10.

[20] Allan Nakanishi is currently an engineer working for ADEC and addressed SEACC's question regarding MDL reporting levels in field blanks.

These issues create serious doubt regarding the validity of certain data for Hawk Inlet. EPA guidance outlines procedures for third-party validation. The Forest Service should not approve any expansion plan until HGCMC's GPO, QAPP, and laboratory procedures and information have been updated to accurately reflect the laboratory/ies involved and what exactly each lab is responsible for analyzing; a third-party data validation analysis framework is in place; and the issue with field blank contamination has been resolved.

The annual monitoring report for Hawk Inlet should provide more clarity and data so that trends can be identified: providing a five or six-year "average" concentration number and then comparing it to sample data from any given year does not make it possible for the reader to identify long-term trends over time. Trends are more important than levels year to year; the annual reports do not include datasets that paint a clear picture of trends over time. SEACC finds many of these recent annual reports to be mediocre in terms of transparency and clarity.

It is in the best interest of Greens Creek to make reports complete and easy to read and interpret. Up until 2013 or so, the Forest Service and Greens Creek project documents were of better quality and much easier to read and interpret. The newer documents exhibit less detail, less coherence, lots of copy-and-paste from previous documents, a lack of complete information about each given topic, no additional information when it is important, and very little information that is useful when attempting to identify trends over time. This must be addressed.

3.B. Lead in Hawk Inlet Sediments and Aquatic Organisms

Aquatic biomonitoring associated with the Greens Creek Mine has been occurring in Hawk Inlet as part of Greens Creek Mine's monitoring program since 2001.[21] Aquatic biomonitoring includes analysis of periphyton abundance,[22] aquatic invertebrate density and community structure, juvenile fish abundance, concentrations of select elements in fish tissues and toxicity testing.

The National Marine Fisheries Service expressed concerns about metal levels in Hawk Inlet as far back as 2003, citing increasing concentrations of contaminants (lead, zinc and copper) in sediments and bioaccumulation data for polychaete worms.[23] NMFS stated that it was "unable to concur with the finding that the proposed actions (i.e., expansion of Greens Creek) are not likely to adversely affect EFH (Essential Fish Habitat)." It stated that the limitations of the

[21] Durst & Townsend, 2004, at vii.

[22] [*See* Wikipedia. 2023. https://en.wikipedia.org/wiki/Periphyton. Periphyton refers to a complex mixture of algae, bacteria, microbes and other growth attached to submerged surfaces in most aquatic ecosystems. Periphyton is an important food source and is an important indicator of water quality and toxins.]

[23] NMFS 2003.

monitoring program made it difficult to quantify impacts of metals accumulation on EFH and managed species, but that despite these limitations, "...lead increased in sediment and tissues after commencement of mine operations." NMFS also expressed concern over metal levels in sediments at S-4 and S-5 in terms of potential bioaccumulation in higher trophic level species, and reduction in the abundance and diversity of benthic communities, which in turn, reduces prey availability for managed species (*at* 2).

The 2003 Oceanus Alaska report included trend data for metals accumulations in Hawk Inlet sediments and aquatic organisms and findings were clear that lead concentrations in sediments, polychaete worms, and mussels increased during the mining production period as compared with the pre-mining period.[24] More recent reports, site analysis, and risk characterization reinforce the trend findings defined in 2003. In 2010, seawater column monitoring results indicated levels of lead above the previous 5-year average at all three sample sites (106, 107, and 108).[25] In 2016, bioassay results revealed average lead concentrations in mussel tissues were five times higher than in pre-production periods.[26]

Sediment Site S-3

Discussion around sources of lead responsible for elevated metals readings (particularly lead) in three "background sites" have concentrated on the justification for removing Site S-3 from *required* testing, although it appears that HCGMC has been voluntarily testing this site. In 2011, the Hawk Inlet annual monitoring report stated that S-3 was dropped because the test results exhibited significantly different trends from S-1 or S-2, the two other background sediment sampling sites in Hawk Inlet. All three of these sites were used to calculate baseline values until 1989, before the mine was actually producing ore.[27] The primary reason given for removing S-3 as a testing site throughout every document since the 2011 report is based on an undocumented observation of an unverified "mass wasting event," which was originally described in the 2003 Oceanus report and cited dozens of times afterward throughout the project record. This event is characterized as follows:

> *Field observations of a mass wasting event in the watershed above station S-3 led researchers to surmise that the event released metals from abandoned historic mine workings into the environment*.[28]

[24] Oceanus Alaska 2003, at 50-54.
[25] *HIMR* 2010, Table 2-4.
[26] HCGMC 2016, at 20.
[27] *HIMR* 2011, at 3.2.
[28] *Id.* at 50.

There is no detail provided with this explanation that could possibly validate this assumption. How far "above" S-3 was it? There are no names of the "researchers," the event itself is not described, dated or pictured, either before or after it took place, and there is no evidence that such an event took place, let alone that it caused, or is still causing, the increased metals concentrations at the head of Hawk Inlet at S-3. This is not a valid explanation or justification for changing the site's status. It seems more realistic that the increasing levels of metal in sediments at that location concerned researchers enough that they were searching hard for an explanation outside of influence by Greens Creek Mine, given its distance from the site. Another attempt to explain S-3's metals levels as "natural" has been made in a more recent risk characterization report, but this is unconvincing.[29] So are the accompanying comparisons to pollution levels in Gastineau Channel.[30] Such comparisons are misplaced — a formerly pristine wilderness bay in a remote area and a major shipping channel in Alaska's capital city should not be compared because they are not comparable.

It appears that data from S-3 may have skewed test results to portray the increase discussed in the 2003 report as a "slight" increase, as data trends for sediments were presented in this report by averaging data from all three background sediment monitoring sites, and levels at S-3 were significantly higher for most metals. The Oceanus report questions the appropriateness of S-3 as a background site, suggests reconsideration, and notes that it is included in the Hawk Inlet average for both baseline and post mining comparisons.[31] SEACC has formerly raised this issue, and it remains a concern.[32]

The 2003 report also states that the 1981 pre-mine baseline condition sediment studies were not used to continue to inform Hawk Inlet monitoring results. This decision was explained in terms of the fact that the 1981 sample sites were **subtidal,** meaning only influenced by effluent from the mine and seawater. In fact, the Holland study evaluated *both* intertidal and subtidal samples, and describes intertidal sediment composition and properties in detail at the head of Hawk Inlet,[33] so it is unclear why those study results were never used in terms of establishing baseline conditions prior to mining activity. The limitation of the study, if any, is acknowledged by the author:

> *"Because only a single sediment sample was collected with the five biological samples from each of these sites, the effects of the heterogeneous nature of the sediments on the*

[29] *Id.* at 89.
[30] *Id.*
[31] *Id.* at 51.
[32] Southeast Alaska Conservation Council. 2020.
[33] Holland et.al., at III-4.

biota could not be quantitatively determined–only a qualitative association could be established."[34]

This limitation applied specifically to two sites: the head of Hawk Inlet and the Greens Creek delta, and only because the sediments at these sites were different in terms of their physical makeup — there were larger-grained particles mixed in with the finer sediments typical of other sites. These factors have nothing to do with metals levels in sediments, nor is there reason to suspect that there would be a significant difference in metals concentrations between inter- and subtidal sediments in "background" or baseline condition sites. SEACC believes that the decision not to use sediment data from 1981 was not made using a scientific basis.

Sites chosen and sampled by the Oceanographic Institute of Oregon (OIO) from 1984-1989 (after Greens Creek had initiated exploration and construction but before it was actually producing ore) were **intertidal** sites, meaning they are influenced not only by effluent and seawater, but by precipitation, air and marine organisms. It is unclear how the presence of marine organisms would affect metal levels in sediments.

The 2003 Oceanus report states that the natural baseline for comparison of post-mining data in sediments in Hawk Inlet is based on the average values from sample stations S-1, S-2, and S-3, and that only OIO's data was used. A chart averaging sample results for all 3 stations for a suite of metals was provided (Table 2-6), supposedly representing pre-mining baseline conditions. These stations already exhibited metal concentration trends higher than national "Effects Range–Low" (ERL) ranges, so it is unclear exactly why the decision was made to characterize any of these sites as "background" or baseline sites, but it seems clear that after the initial Greens Creek ore spill directly into the inlet, numerous areas should have been considered at least potentially compromised in terms of representing pre-mining, baseline conditions.

Sediment Station S-1 and S-2

Lead concentrations at these "background" stations have been higher on average since production began, relative to pre-production. 2018 concentrations were higher than average for the other production years.[35] These trends are not mentioned in the 2019 HIMR. The conclusion that these results indicate "natural" variability of metal concentrations in the area is unsupported.[36]

[34] *Id.* at III-5.
[35] *HIMR* 2018 at 22.
[36] *HIMR* 2019 at § 5.0.

Aquatic Biomonitoring

When Greens Creek Mine was being considered by the USFS in the early 1980's, protection of the area and biological community was the prerequisite for development. Accordingly, in 1981, the biological community was surveyed for habitat integrity, species diversity and abundance to form a pre-mining baseline. Most of this work was accomplished by A.F. Holland, et.al., in a report for Greens Creek, then owned by Noranda Mining, Inc. That baseline was supposed to provide a control by which to measure impacts on the biological community from mine development. It has long been claimed that there is no data available to compare species diversity or abundance between pre-mining and post-mining years, despite the existence of the 1981 data. Comments from the public and from SEACC have repeatedly requested that an attempt to duplicate the studies be made. One response has been that there are no locations given for sample sites in the 1981 study. That statement is not accurate. The descriptions of the sites that were sampled for sediment and aquatic organisms are described very thoroughly. The descriptions are far superior to similar documents produced today in terms of scientific detail. A GPS coordinate was not necessary then, and it isn't now in order to do the same work in the same area under the same conditions that were so well-described in Holland, et.al. In the 2003 Oceanus Alaska report, it was suggested that replicating the earlier studies would provide a sufficient baseline for an accurate comparison. However, HGCMC has never replicated the study or been asked to do so by the Forest Service or ADEC. The Forest Service and ADEC should require that the baseline study be reproduced now.

Available evidence contradicts conclusions that no biological community has been impacted by the mine's operations. Holland's original work documented that, pre-mine, metal levels in sediments in Hawk Inlet compared to levels reported for "pristine" and unpolluted marine waters of the Pacific coast and were many times lower than levels reported for polluted or semi-polluted waters.[37] In 1999, Carlson observed schools of herring spawning in Hawk Inlet in late spring, but by 2011 there were no herring present, according to Monagle.[38] In 2016, a clam survey was conducted by ADF&G.[39] That study reported no clams at the Greens Creek delta study site. In 2017, the HIMR acknowledges dwindling clams in the area:

> *"Duplicate samples are not taken for all species (clams and worms) due to the negative impact such removal would have on the relatively sparse populations present on the Hawk Inlet bioassay monitoring sample sites."*[40]

[37] Holland et.al., 1981 at III-6.
[38] *DSEIS* 2023 at § 3.12.4.1.
[39] Hawk Inlet Intertidal Clam Investigation. December 15, 2016. Kyle Hebert, Dive Fisheries Research Supervisor.
[40] *HIMR* 2017 at 18.

The 1981 study indicated hundreds to thousands of individuals present at these same locations.[41] The 2013 EIS supports this and other sources which show that there were a large variety of fish and shellfish resources present in Hawk Inlet prior to mine development, including halibut, herring spawning, crab, and:

> "...extensive beds of clams including littlenecks (*Protothaca staminea*), cockles (*Clinocardium nuttallii*), soft shell (*Mya arenaria*), and horse clams (*Tresus nuttallii*), as well as mussels (*Mytilus trossulus*)..."[42]

In 2003, mussels and polychaete worms in Hawk Inlet exhibited clear trends of increased concentrations of metals including lead from pre-mining to mining periods; although not sampled regularly, cockles, little neck clams and soft shell clams also exhibited elevated trends over a 20-year time period.[43]

The Forest Service should not approve any alternative until these baseline studies have either been repeated, or the original baseline data is included and used to compare current conditions in Hawk Inlet to pre-mining conditions.

Friends of Admiralty Clamshell Study

In March of 2023, nonprofit advocacy group Friends of Admiralty National Monument released a summary of an independently funded study of the source/s of lead in Hawk Inlet. SEACC refers the Forest Service and ADEC to this study, which used stable isotope ratios to demonstrate that lead in living clamshells in Hawk Inlet, as compared with neighboring Young Bay (not impacted by mining) originates from Greens Creek Mine.[44]

3.C. Sources of Lead in Hawk Inlet

Tailings Disposal Facility

The tailings disposal facility (TDF) at Greens Creek is essentially a large open area where filtered, pressed tailings are stored. The "dry-stack" system used at Greens Creek is somewhat unique in that many other hard-rock mines, especially in wet climates, use the more familiar wet tailings system, where tailings are stored submerged in ponds or other man-made water bodies, usually entailing the use of a dam or multiple dams to keep water and tailings from escaping. As history has shown, these dams periodically fail, causing untold environmental disaster, as in the Mt. Polley mine disaster in British Columbia, Canada, on August 4, 2014.[45]

[41] [As cited in Oceanus Alaska, 2003.]
[42] USDA Forest Service Tongass National Forest. 2013.
[43] Oceanus Alaska 2003 at 53-58; Rudis 2001, as cited in Oceanus 2003.
[44] Friends of Admiralty Island. 2023. [Executive summary of isotope clamshell study of Hawk Inlet.]
[45] Province of British Columbia.

While the dry-stack TDF at Greens Creek may be the lesser of two evils, there are certainly risks inherent with this system of tailings disposal, including liquefaction, metal-laden fugitive dust blowing off the pile, and potential resource impacts associated with liquefaction or deformation of the pile.

Fugitive Dust

In the 2013 EIS, control of fugitive dust appears as a required mitigation measure, and is a requirement of the Waste Management Permit.[46]

Fugitive dust describes particles of various sizes that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.[47] The 2023 DSEIS provides only one year of wind data to inform evaluation of fugitive dust movement(2021).[48] According to data collected from a single weather station for 2021, wind at the TDF facility typically blows from the north-northeast and west, west-northwest. The document acknowledges that the weather station is placed so that winds from more southerly and easterly directions are blocked by the water treatment plant, and thus the data provided may inaccurately represent these wind patterns.

The 2013 EIS and ROD offer more specifics and discussion about dust mitigation than the 2023 draft. Table 3.2-6 describes numerous dust control measures as defined by the Western Regional Air Partnership's Fugitive Dust Handbook, including *cessation of operations* if wind speed exceeds 25 mph, application of dust palliatives twice per hour in such conditions, along with specific thresholds like wind speed and duration.[49] This specificity and discussion is missing in the 2023 document and must be included in a finalized version.

The DSEIS discussion also fails to capture the significance of episodic, high-loading events. Analysis of the tables in the Waste Management Plan Annual Reports shows very significant episodic events. One example is from Table 4.2.g.[50] On a single day, November 15, 2016, a single ADP dust collector recorded 54% (65,155 of 120,617 µg/m3) of the total lead loading recorded for the entire 2016 year. Similarly, in 2018, a single ADP dust collector record

[46] HGCMC, 2020, Appendix 1.
[47] 40 CFR 52.21(b)(20).
[48] *Id.* at § 3-10.
[49] *Id.* at § 3.2.3, 3-13.
[50] HGCMC. 2017. *Active Tailings and Production Rock Site 2016 Annual Report.*

(1/10/2018 to 1/17/2018) contributed 57% (126,452 of 218,691 µg/m3) of the total lead loading recorded for the entire 2018 year.[51]

Historical wind speed, wind direction, temperature, and humidity data from the TDF location are not presented in the document other than the single year data used in the AERMOD modeling. The DSEIS should disclose all available wind speed, wind direction, temperature, and humidity data from the TDF site. Critically important are daily maximum gusts during low humidity and low temperature, which indicate the presence of the Taku wind episodic conditions common to winter months. Additional monitoring and mitigation requirements should focus on periods of predicted or observed wind and temperature conditions which create the highest transfer of fugitive dust. Additional mitigation methods, including a pause in tailings deposits during those events, should be considered and included in monitoring plans and Greens Creek's GPO.

Greens Creek's fugitive dust monitoring method essentially uses six pails, called Atmospheric Depositional Containers (ADC), [sometimes referred to in the project record as Atmospheric Deposition Pails (ADPs)] at various locations around the TDF. These containers are an "adaptation" of the American Society for Testing and Materials (ASTM) D1379 Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter).[52] HGCMC acknowledges that the containers are a "crude and non-specific" method of measuring direction and distance that the dust may travel.[53] There is no separate, official monitoring or mitigation plan for fugitive dust, specifically.

In the GPO, HGCMC expresses an intent to install one, "perhaps two," real-time monitors (RTM) to the south of the TDF.[54] According to the 2023 DSEIS, only one of those was installed.[55] The Forest Service should require additional real-time dust monitors in strategic locations, including the addition of at least one weather station near the TDF that is not blocked by any facility structure and can capture wind data from southerly and southeasterly directions.

In the 2020 GPO, Greens Creek describes its current fugitive dust monitoring methods in the IMP. Mitigation methods specifically used at Greens Creek are difficult to find and are located in numerous places in the document. Tailings placement, for example, and the watering of tailings is discussed in Appendix 3 of the GPO — the TDF management section; however, these techniques are also important when discussing actual mitigations to fugitive dust release. Air

[51] HGCMC. 2019. *Active Tailings and Production Rock Site 2018 Annual Report.* P.13.
[52] *Id.* at 01-33.
[53] *Id.*
[54] *Id.* at 1-34.
[55] *Id.* at 3-12.

quality is also a separate Appendix (12) of the document, and one or two specific dust mitigation methods are discussed here:

- Transport of tailings in covered trailers and conveyors
- Transport of concentrates to container ships uses an enclosed conveyor system with a telescoping snorkel

SEACC studied Forest Service inspection reports that state that dust fencing is used to help block dust escape at the TDF,[56] but it was impossible to find specific mention of that mitigation method as it applies to fugitive dust in the 2020 GPO or DSEIS. Truck washes are also in operation at Greens Creek to remove dust, but that is not evident in the specific sections of the GPO dealing with fugitive dust. Nonetheless, the Forest Service is clear about the fact that it expects Greens Creek to get fugitive dust emissions to near-zero:

> *"Existing mitigation measures to minimize the mobilization of fugitive dust …at the TDF are insufficient given sampling data that indicate elevated levels of lead, zinc, and other metals in snow and lichen adjacent to the TDF…elevated levels…may be found for several thousand feet downwind of the TDF."*[57]

The DSEIS states that additional mitigation and monitoring will be required for all alternatives:

- A Forest Service-approved monitoring and mitigation plan will be developed and finalized within 6 months following approval of the final ROD. "*Near-zero fugitive dust detection at monitoring sites…would be required prior to proceeding with expansion activities under any of the action alternatives* [emphasis added]*."*
- Additional deposition and lichen monitoring sampling sites located in areas of potential maximum deposition and extending at least two miles from the TDF.[58]
- ADC samples collected weekly for sites near TDF; monthly sampling for sites at extended distances (this already occurs).
- Include particle size distribution through refining sampling methodology.
- Re-evaluation of the weather station given its location close to the water treatment plant building.
- Performance of new deposition modeling in five years.
- Comparison of monitoring data for five years.

[56] Tongass Minerals Group. 2022.
[57] DSEIS at 3.2.2.7, 3-38.
[58] *Id.* at 3-39.

None of this really counts as "mitigation." Improved monitoring is certainly desirable, but there are limited specifics about how Greens Creek can actually decrease dust escape. The Forest Service states that it expects "near-zero" fugitive dust emissions from the TDF but it doesn't say how it expects Greens Creek to accomplish that. Specific examples of dust mitigation we found during our research[59] were:

- Installation of windbreaks and/or dust fencing around the TDF; fencing should be inspected and maintained carefully, especially during typical high-wind months — winter months. Inspections during these high-loading periods, as identified by the GPO and DSEIS, should focus on fugitive dust monitoring results and mitigations in use.
- Wet suppression (this technique may not be appropriate for dry-stack tailings facilities such as Greens Creek because of the need to keep the pile as unsaturated as possible — Red Dog Mine was investigating palliatives to use for dust control on storage piles in 2008).[60]
- Application of dust control agents (palliatives) to road surfaces.
- Temporary cessation of tailings deposition in periods known to contribute heavy dust loading — i.e., cold, dry winter months with strong winds from the north-northeast-east.

The Forest Service should ensure that fugitive dust monitoring and mitigation, including specific techniques used, photos of monitoring locations, silt fences, and other infrastructure such as truck washes are part of a separate, distinct Fugitive Dust Monitoring and Mitigation Plan that discusses all the monitoring, reporting, and mitigation requirements and results in one place. This plan needs to be in place before, not after, the ROD for any alternative is signed. SEACC does not support any alternative approval before this plan is created and in place.

2021 Risk Characterization Report

In 2021, a third-party contractor, Ensight LLC, produced a Risk Characterization Report for HGCMC. In Section 5.4.4, key findings of this study are presented, which have been discussed previously to some degree (i.e., fugitive dust escape occurs most frequently in cold, dry and windy winter conditions at the site). However, throughout the document, an arbitrary method of defining risk is used that does not appear to conform to accepted scientific benchmarks or thresholds when describing risk:

[59] [SEACC acknowledges that some of these methods may already be in place at Greens Creek, but it was not entirely clear.]

[60] Teck Cominco Alaska Incorporated, 2008.

> *"To assess potential effects to environmental receptors, Hazard Quotients (HQs) are calculated. A Hazard Quotient is defined as the ratio of the potential exposure to a substance and the level at which no adverse effects are expected. A Hazard Quotient of 1.0 or less means adverse effects are unlikely and can be considered a negligible hazard. A Hazard Quotient greater than 1.0 indicates the possibility (but not certainty) of adverse effects and suggests that additional information should be evaluated to ascertain where adverse effects may be occurring."*[61]

It is unclear what science or accepted risk management system has been used to develop these "hazard quotients." There is no explanation of any scientific rationale behind using these numbers rather than Alaska water quality standards numbers or other well-understood screening benchmarks. SEACC considers this report of limited use, therefore, in understanding impacts to Hawk Inlet, risks to aquatic organisms or other factors of risk associated with mine operations. A firmly established scientific threshold or screening benchmarks should be used instead.

Regardless, the report's findings still support SEACC's previous findings and suspicions about lead mobility:

- In three groundwater sampling sites downgradient from the TDF, lead levels frequently exceed thresholds (at 36).
- Surface water sites have exhibited lead exceedances periodically.
- Site 61 is located in a wetland adjacent to Greens Creek, downgradient from waste rock facilities and Ponds D and 23. Results indicate higher sulfates, alkalinity, hardness levels, and metals levels, including lead, than in a corresponding surface site — 48 (supposedly a "background site").[62] These differences are explained by the difference in flow between a wetland and a creek — with no such data presented in this report and only the "hazard quotient" level for reference, it is impossible to determine, as the report states, that the results do not suggest environmental degradation.

Air Quality and Emissions

SEACC also has concerns about the dust emission modeling. It appears that the modeled amount of dust generated from the tailings pile has been significantly underestimated. The fact that key documents required to understand the modeling protocol are not online and readily available for public review causes us serious concern about the ability of the public to understand the DSEIS and effectively comment on fugitive dust concerns. The Forest Service

[61] Ensight LLC. 2021. *HGCMC Environmental Risk Characterization Report,* at 32.
[62] *Id.* at 42.

should require an in-depth fugitive dust ecological risk assessment with public input through a public comment process as part of the development of a fugitive dust mitigation and monitoring plan.

Assuming the WRAP handbook contains updated fugitive dust data and information, the general emission factor of 0.11 tons PM10/acre-month was improperly multiplied by a factor of 0.5 in consideration of watering as a Best Management Practice.[63] The contribution of watering is already factored into the 0.11 tons/acre/month emission factor: "The construction emission factor is assumed to include the effects of typical control measures such as routine watering. A dust control effectiveness of 50% is assumed from these measures, which is based on the estimated control effectiveness of watering."[64] The 0.5 multiplier should be eliminated from the emission rate calculation.

Additionally, calculation of the emission rate failed to take into account the very high silt content of the tailings (85%) when adopting the 0.11 tons/acre/month emission factor.[65] That report states:

> *"The average dry silt content found for the test sites in the BACM report was 9%. To adjust for the level of silt content of surface soil in a particular county, a proportionality is used along with the base emissions. The equation to adjust for silt content is: Silt Content Corrected Emissions = Base Emissions x (s /9%) where s = % dry silt content in soil for area being inventoried."*[66]

With an 85% silt content, the Base Emission 0.11 ton/acre/month emission factor used should be multiplied by 9.44 for an emission factor of 1.04 tons/acre/month. This yields an emission rate approximately 19 times the one used in project modeling. 85% silt content is based on Table C-5.[67]

[63] Boreal Environmental Services. 2022. Appendix B, p. B-2.
[64] Western Regional Air Partnership & Countess Environmental. 2006. *WRAP Fugitive Dust Handbook* at § 3-8. Retrieved from: https://www.wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf
[65] Eastern Research Group & Midwest Research Institute. 1999. *Estimating particulate matter emissions from construction operations: Final report.* [Report for the EPA]. Table 4-8.
[66] *Id.* at 5-13.
[67] Boreal Environmental Services. 2022. *Greens Creek Mine North Extension Project: Tailings disposal facility particulate matter deposition modeling protocol*. Transmitted via email on April 25, 2023.

3.D. Freshwater Monitoring

Tributary Creek

The TDF facility is located in the upper reaches of the Tributary Creek drainage, which drains directly into Hawk Inlet. The impact of the TDF on Tributary Creek is monitored using freshwater stream data from Site 9.[68] Site 9 clearly shows a trend of exceedance, but only two years (2017 and 2019) are presented for comparison in HGCMC's 2020 Biannual Report. ADEC listed 0.83 miles of Tributary Creek (AK_R_1020408_006) as a Category 4b Impaired Waterbody in the 2022 Alaska Integrated Water Quality Monitoring Report factsheet.[69] This designation was upgraded from a Category 3 categorization in 2020. Category 4 signifies that the water exceeds the impairment threshold for the toxic and other deleterious organic and inorganic substances standard for the designated use, which is freshwater aquatic life in this case.[70] In the 2022 Final Integrated Water Quality Monitoring and Assessment Report Factsheet. Freshwater monitoring at Tributary Creek during 2020 has shown markedly elevated levels of lead.[71] Attachment U, FWMP Comparison Charts, does not shed any additional light on the subject, as any comparisons between lead levels at any of the sites is missing.

HGCMC claims that there is no "reference site" for comparing data from Tributary Creek to Greens Creek in terms of taxonomic richness and organism diversity.[72] The 2021 Risk Characterization report then makes comparisons between Tributary and Greens Creek benthic organism data, but trends with Tributary Creek's aquatic diversity are obscured because there is no comparison to Tributary Creek's data over time in this report. Explanations about other organisms suppressing benthics and EPT density are unsupported. The following section on Greens Creek population estimates for juvenile fish clearly show a downward trend since 2001.[73] Tributary Creek fish tissue had greater concentrations of many metals, including lead, than Greens Creek fish.[74]

ADEC and HGCMC have agreed that fugitive dust is a potential source contributing to the lead concentrations in Tributary Creek, but in the 2022 report, claim that potential contribution by other pre-existing or natural sources "...has not been thoroughly investigated and cannot be ruled out."[75] Numerous investigations have been mounted with the intent to prove that lead contamination in the Hawk Inlet area has other sources besides Greens Creek Mine, particularly

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[68] *DSEIS* at § 3-61.
[69] ADEC. *Integrated Water Quality Monitoring and Assessment Report factsheet.* 2022. Retrieved from: https://dec.alaska.gov/water/water-quality/integrated-report/
[70] *Id.*
[71] HGCMC. *Biannual Report*. 2020.
[72] Ensight LLC. 2021. P. 63.
[73] *Id*. at 66.
[74] *Id.* at 67.
[75] *Id.* at 5.

"natural" sources. Those studies have not accomplished their goal. In particular, the contamination of Tributary Creek is not attributable to any other source of lead contamination; the contaminated segment is located immediately below the B-road and immediately downstream from the Greens Creek TDF (see Figure 2, p.4). S-3 is located within the now-impaired segment of Tributary Creek.[76]

Other Freshwater Monitoring Sites with Exceedances for Lead

Added in 2020, Site 61 is located near the TDF in a small drainage which flows directly into Hawk Inlet. Test results from the FWMP in 2020 and 2021 indicate exceedances for alkalinity, low pH, lead, and elevated mercury.[77] In 2020, Site 61 clearly shows a spike in lead at or close to the upper limit mark; the report summary does not mention this. Site 29's chart shows that lead levels have had numerous exceedances beyond the hardness-influenced upper limit of WQS. Site 32's chart shows obvious exceedances over the upper limit.[78]

3.E. Marine Water Monitoring

Site 108

Site 108 is one of three Hawk Inlet seawater monitoring sites and is closest to the Outfall 002 diffuser that discharges effluent and waste water into Hawk Inlet after treatment. In 2020 the sample from this site had elevated levels of dissolved lead during testing (as compared with historical data) according to the 2020 Hawk Inlet Monitoring Report.[79]

4. Geotechnical Stability

Expansion of the TDF and the correlated expansion of other infrastructure, including roads, necessitates careful study of geotechnical and geochemical issues. Greens Creek Mine exists in a seismically active region.[80] Two landslides have taken place in two years on the B-road, which is slated for either minor or major re-routing contingent upon the Alternative selected. A geotechnical stability assessment for the proposed expansion was conducted by a contractor in 2021.[81]

4.A. Tailings Disposal Facility (TDF)

In 2006, Peter Condon, Environmental Geochemist for Kennecott Greens Creek Mining Company, and Kerry Lear, a geologist for KGCM, produced a detailed report about geotechnical

[76] SEACC. August 10, 2020. [Letter to Cathe Heroy, Large Project Coordinator, DNR, re. Greens Creek 2019 Annual Reports and Meeting.]
[77] HGCMC. 2020.
[78] *Id.*
[79] *Id.* at 6.
[80] Condon & Lear. 2006.
[81] KCB Consultants Ltd. 2021.

and geochemical stability factors specific to Greens Creek and the utilization of the "dry-stack" or filter-press tailings disposal method (versus the wet tailings disposal that many other mines employ). Condon and Lear described the tailings pile:

> *"Approximately one-third of the pile is underlain by a network of gravel finger drains, which were placed directly over peat prior to original tailings placement in 1989. These drains do not prevent conveyance of head pressures between the pile and the foundation, and the maximum saturated thickness in this area is 10 meters. The remaining two-thirds of the pile (south, east and west flanks) are underlain by a series of blanket drains and finger drains that do dissipate head pressures between the pile and the foundation. Despite having a free-draining base in these areas, the tailings saturate to about 4 meters, likely reflecting the high moisture-retention ability of the silty tailings and a general decrease in hydraulic conductivity with depth*."[82]

Condon and Lear described areas of the tailings pile that could liquefy in a "maximum design earthquake," or MDE event, specifically in areas where sand underlies the pile.[83] That information conflicts with statements from the 2023 DSEIS, which states there was a liquefaction screening assessment conducted for the TDF site in 2021 and that risk of liquefaction within the tailings pile is unlikely.[84] The Forest Service should clarify exactly how that conclusion was reached before permitting an expansion of the mine. The 2013 EIS described a "minimum factor of safety" as 1.5 for static long-term conditions, and as 1.3 for static short-term conditions.[85] The Forest Service should clarify how that relates to the 2023 liquefaction analysis numbers (see below).

The 2021 KCB geotechnical report, in fact, shows that several zones of material in the existing TDF *are*, in fact, susceptible to liquefaction under different earthquake scenarios in Table 5.1, copied below with emphasis added by SEACC. MDE=Maximum Design Earthquake and represents the greatest likely seismic event to occur in the area; OBE= Operational Based Earthquake and represents an earthquake that is likely to occur in the area during the life of the site but for which the site is engineered to withstand.[86]

> *"The above methods involve estimating a factor of safety against liquefaction (FoSLIQ) which is the ratio of resistance and driving forces to liquefaction. A FoSLIQ greater than 1 implies there is enough resistance to prevent liquefaction. For this assessment,*

[82] *Id*. at 356-357.
[83] *Id.* at 357.
[84] DSEIS. 2023 at § 3-42.
[85] *Id.* at § 3.3.2, p.23.
[86] KCB Consultants Ltd. 2021. *Hecla Greens Creek Mining Company North Extension Project Prefeasibility Design*.

liquefaction was assumed if the FoSLIQ was less than 1.1."[87]

Table 5.1 Liquefaction Analysis Results

Unit	Potential for Cyclic Strength Loss
Upper Granular	The results show that liquefiable zones (with $FoS_{LIQ} < 1$) are present at all SCPT and SPT locations under both the MDE and OBE.
Desiccated Clay	Cyclic softening is not anticipated in the Desiccated Clay under the tailings loading of the Project configuration, since the material is not loaded beyond its apparent pre-consolidation pressure.
Laminated Sand and Silt (LSS) – Within Trough	Layers (typically several feet thick) of liquefiable deposits (with $FoS_{LIQ} < 1$) are present under both the MDE and OBE loading.
Laminated Sand and Silt (LSS) – Outside Trough	SCPTs east of the bedrock trough (along Section B) did not have any contractive zones and the FoS against liquefaction >2.
Soft Gravelly Clay (GRC)	Cyclic softening is predicted to occur (with $FoS_{LIQ} < 1$) for the GRC in the bedrock trough for MDE loading, but no significant softening is expected for the OBE. No cyclic softening is predicted in SCPTs outside of the bedrock trough based on the methods listed above. However, the SCPT data implies a low overconsolidation ratio in the Gravelly Clay so it reasonable to assume the Gravelly Clay outside of the trough may be susceptible to cyclic softening below the tailings stack for MDE loading, unlike the Desiccated Clay.
Hard Gravelly Clay (GRC)	Due to limited site investigation in the Hard Gravelly Clay, it was conservatively assumed that material properties in the sub-unit would be the same as within the Soft Gravelly Clay.

The 2023 DSEIS concluded that the expansion characterized in Alternative D would *not* meet safety limits associated with slope stability, liquefaction or deformation using a two-dimensional model. Expansion alternatives B and C meet safety limits under the same analysis method (at 3.3.2.5, 3-45). Additionally, an extension of the mine's operating life for up to forty years, as stated in Alternative D, greatly increases the probability that an earthquake of some magnitude *will occur* while the mine is still in operation. For this reason, the Forest Service should not approve any alternative which would allow for decades of continued operation without more stringent construction requirements, geotechnical monitoring requirements, and specific requirements relating to tailings placement, compaction, and saturation. As discussed below, maintaining stability within the TDF depends largely on employing BMPs consistently at the site.

Condon and Lear emphasized that maintaining a low water table in the tailings pile is critical to ensure geotechnical stability.[88] They also emphasized that the tailings pile is vulnerable to saturated conditions, particularly during terms of periods of heavy precipitation. The use of synthetic covers, temporary dry storage, and strict adherence to BMPs for tailings placement and compaction "may be required to ensure geotechnical stability."[89] This evaluation reinforces the need for the Forest Service to actively expand and update BMPs. As the tailings pile grows, every mitigation procedure intended to ensure geotechnical stability, contain potentially acid-

[87] *Id.* at 10.
[88] Condon & Lear. 2006. P. 361.
[89] *Id.* at 362.

generating runoff, and maintain water balance and pore pressure becomes more important in terms of environmental protection and compliance. Recent inspection reports from the Forest Service note some ongoing issues with water management BMPs at Greens Creek in terms of stormwater sediment management, sump pumps, turbidity, and related water management factors.[90] SEACC is concerned with any expansion breaking ground before specific water balance and water management plans are updated to include additional monitoring and mitigation plans. It is concerning that the DSEIS identifies no additional monitoring or mitigation for geotechnical factors beyond the two very general factors specified in the 2013 EIS:

- *Tailings pile must be constructed with compacted outside side slopes that are no steeper than 3H:1V; slopes during operation may be steeper than 3:1 if future operation or slope work is planned or approval is obtained.*
- *Locate ore stockpiles and waste facilities on stable, level sites (Forest Service 2013).*[91]

These mitigation measures are inadequate, especially considering the proposed changes, and should be re-evaluated and expanded prior to approving any of the alternatives.

4.B. B-Road

Two major landslides have taken place within the past two years at Greens Creek along the B-road corridor. In 2020, a landslide occurred below the 3.4 mile area, directly adjacent to the road.[92] A cut/fill buttress stabilization method was proposed, including installing a perforated pipe within the buttress to manage water. On September 27, 2022, another landslide occurred at the 5.6 mile point; apparently there had been noted issues at this area previously.[93] However, the DSEIS shows zones of high hazard (Mass Movement Index 3 or greater) designations along the B-road corridor in Figure 3.1-1 and states that "no landslide activity has occurred within the study area…"[94] Even if those exact points were not included in the DSEIS study of site seismicity, this statement is misleading and leads a reader to believe that the entire Greens Creek site has been free of earth movement during the mine's existence — this is a mischaracterization.

[90] USDA Forest Service, Tongass National Forest, 2023; Tongass National Forest Minerals Group, 2021; Tongass National Forest Minerals Group, 2022.
[91] DSEIS. 2023. § at 3.3.2.1.
[92] Tongass National Forest Minerals Group. 2021.
[93] Tongass National Forest Minerals Group. 2022.
[94] *Id.* at 3-39.

While the DSEIS does address climate change in a brief section,[95] and acknowledges that climate change and related factors of precipitation and temperature could affect geotechnical stability, in the same breath it seems to dismiss such issues:

> "*If warranted* [emphasis added], the Applicant would continue to conduct geotechnical monitoring to predict potential hazardous conditions."

No specifics of what kind of monitoring would be "continued" are provided. Given the seismic characteristics, soil characteristics, and history of landslides at Greens Creek, SEACC believes that continued and expanded geotechnical monitoring is absolutely "warranted," and in fact, should be mandated through additional mitigation and monitoring. The Forest Service should work with HCGMC to develop an expanded geotechnical monitoring plan before approving an expansion. Additionally, data from all piezometers at the TDF showing long-term trends in pore pressures at different areas of the pile should be provided to the public.

In the next section, the DSEIS addresses geotechnical stability from a cumulative effects view; however, the "study area" *only* includes the TDF pile footprint.[96] As the B-road is integral to operations and any expansion, it is vital that the Forest Service include complete geotechnical data for all areas that are proposed as existing or alternate locations for the B-road.

Under Proposed Alternative B, the B-road is planned to be moved as much as 350 feet to the east, up-slope, to make room for the TDF extension. However, the same design criteria that were used to construct the B-road will be used to move it; if two landslides have already taken place, it begs the question whether a more stringent road design would be preferable. It appears that slopes along the existing road corridor are not stable; however, no discussion of the landslides, the repairs or their efficacy, or concerns about future landslides impacting the road and safety of users exists in the DSEIS; the DSEIS only discusses geotechnical stability factors in terms of the TDF footprint itself. SEACC suggests this is an inadequate study of geotechnical factors for Greens Creek, given its site history of landslides and high zones of seismic activity.

5. Geochemistry

In the 2013 EIS, the Forest Service stated that it would require HGCMC to update the water quality mixing model using updated water quality data associated with the TDF.[97] A corresponding requirement to produce a report describing changes to the mixing model, model

[95] DSEIS. 2023. § 3.22.3.
[96] *Id.* at 3-321.
[97] *Id.* at 3-38.

assumptions, and results was supposed to be included in the five-year audit that is supposedly required as part of the ADEC WMP. However, that audit has not taken place on schedule and it is unclear if this report has been produced and provided by HGCMC. The Forest Service, as Lead Agency, must ensure that ADEC is following through on required evaluations such as facility audits, and if not, the Forest Service should work with HGCMC to schedule third-party audits every five years so that associated compliance factors can be met. Meantime, SEACC requests that the updated water quality/mixing model report described in the 2013 EIS be produced before any expansion alternative is approved.

6. Compliance, Reporting, and Inspections

6.A. Analysis of the 2009 and 2019 Greens Creek Audits

According to the WMP, a third-party facility audit is required to verify compliance with applicable environmental laws, and is required "during the final year of the permit term."[98] The permit term for the WMP is five years; notably, only two audits have been recorded in the mine's more than 30-year existence, one in 2009 and 10 years later in 2019. Numerous extensions of the WMP appear to have allowed this condition to persist. The Forest Service, as Lead Agency, must work with ADEC to ensure that permit renewals and facility audits are conducted in a timely manner, as required through permit terms. From a NEPA perspective, the Forest Service should not rely on the existing WMP if it has expired, hasn't been audited in a timely fashion per requirement, or is incomplete.[99]

Additionally, the two audits were not conducted in a similar way in terms of factors evaluated, document layout, or headings, so comparing what was actually audited and tracking resolutions over time proved challenging. Facility audits should be constructed in a formulaic manner and not be left open to interpretation in terms of what is evaluated; the same criteria, with additions, deletions, and explanations as circumstances require should be used for each facility audit so that trends over time and non-compliance issues can be tracked by the public. These audits, conducted ten years apart, are generally not useful for those purposes, because they do not follow the same reporting format or criteria.

[98] ADEC. 2014. *Waste Management Permit* at § 2.8.
[99] 40 C.F.R. 1502.21(b).

2009 Audit items:

Geotechnical stability
Seepage and run-off from facilities
Long-term water treatment
Conflicts and inconsistencies in the Waste Management Permit and General Plan of Operations (GPO)
Monitoring
Spills and releases
Stormwater and sediment control
Agency oversight
Water Use Authorizations — stated that auditors were able to find all records they needed when they looked.
ADEC Air Quality Permit
General Compliance — *Tailings and production rock have not been analyzed for paste pH since 2005*, which is required by the WMP and GPO.
Agencies–There is no evidence of any regulatory agency conducting independent compliance sampling

2019 Audit does *not* evaluate**:**

ADEC Air Quality Control Permit
Alaska Pollutant Discharge Elimination System (APDES) Water Discharge Permit (AK0043206)
Water Use Authorizations
U.S. Environmental Protection Agency (EPA) Hazardous Waste
Spill, Prevention, Control, and Countermeasure (SPCC) Plan
U.S. Army Corps of Engineers (USACE) 404 Permit
Sewage Treatment

2019 Audit Recommendations – Baseline Data

Topic	2019 Audit Recommendation
Geochemistry	Include past geochemical data and baseline tailings data for comparison in the IWMDP (2019 audit at 8)
Freshwater Monitoring	Collect background water quality samples from an undisturbed setting to compare results for FW monitoring near the TDF (at 8).
Freshwater Monitoring	Develop baseline for additional parameters including pH for comparison of Sites 27, 29, 32; the existing baseline being used began well after TDF operation (at 13).
Geotechnical Monitoring	A baseline record of observations for the Pond 10 dam

	has not been established (at 53). Results indicate potential stability issues.
Reporting and compliance	Improve clarity regarding background characterizing conditions, and reduce reporting inconsistencies (at 46).
Agency oversight	Revisions to the WMP that would clarify water quality exceedance reporting trigger; it would improve certainty of protection of state resources if triggers over background WQ was clarified

Other significant findings from the most recent audit (2019) are as follows:

- Recommendation that, due to concerns for surface water quality, HGCMC continue fugitive dust abatement and use of coverings, particularly in winter months when historical data show dust loading is typically the heaviest; the audit echoed the 2023 DSEIS assumption that it should be possible to reduce/minimize tailings dust with appropriate planning prior to winter (at 9).
- The IMP states that surface water at Site 23 will be monitored annually; this is considered "elective" monitoring, but there are no surface water monitoring results reported after 2014. Recommendation that HGCMC update the IMP to reflect what is being monitored and provide that data (Table 3-1).
- Recommend that WMP be revised to clarify quarterly and annual reporting expectations (at 50).
- Recommendation that annual waste rock sample analysis data be included, as the IMP states (Table 3-1). No such data is available in annual reports.
- Recommendation that the appendices in the GPO (the IMP, IWMDP, and WRMP) be updated to reflect current monitoring conditions and be consistent across the documents (at 15-16).

6.B. Inspections and Reporting

Several issues with water quality reporting, Best Management Practice compliance, response, and prompt action by Greens Creek exist during the past three to five years. Some of the issues raised in the USDA Forest Service's inspection reports have been ongoing; others have been resolved relatively quickly. Most of SEACC's concern lies with the fact that the items requiring action in the most recent inspection reports concern water quality BMPs. Water quality and management are perhaps the most important factors in Greens Creek Mine's operations in

terms of ensuring environmental protection,[100] and with a planned expansion of the TDF and associated infrastructure, these elements become much more critical.

After 2019, the Freshwater Monitoring Report (FWMP) format and analytic testing methods changed considerably, making it more difficult for a reader to identify long-term trends with site water quality. Instead of providing water quality data site by site, now a brief summary is provided with directions to go to Attachment M to see maps of the site locations, Attachment U or V to see trends over time (only 5 years of data are provided; hardly a long-term evaluation), and still other attachments for related data. This separation of information appears to obscure information about water quality exceedances and trends.

Historic reports were produced separately for Active Tailings and Waste Rock Management until 2020; in 2020, the discussion of operations at the TDF was shortened dramatically and included in the Biannual report, rather than as a stand-alone report. This change of reporting requirements and/or format by ADEC appears to have the effect of hiding information from the public. SEACC strongly recommends that the Forest Service and ADEC work to ensure that Greens Creek provides individual reports for distinct elements of mine operation, instead of squeezing them into one document with twenty-four attachments or appendices.

6.C. Other Information

SEACC refers the Forest Service to the comment submitted by the Center for Science in Public Participation (CSP2) for detailed comments about bonding and reclamation requirements, potential removal of pyrite from tailings, and flow augmentation as contact water treatment. SEACC particularly supports both pyrite removal and flow augmentation as mitigations to water quality concerns both from the TDF and at the outfall (discharge). Flow augmentation provides a way to eliminate a surface water mixing zone and is currently being used at Pogo Mine in Alaska (see CSP2's comment, p.1). The justification provided in the 2023 DSEIS for not further investigating the feasibility of pyrite removal is unsupported. The addition of many more tons of tailings to the pile should indicate an increased need to make the tailings as benign as possible — that the old tailings did not have pyrite removed from them isn't a legitimate excuse for not considering methods available to remove pyrite from new tailings before placement.[101]

7. Conclusion

In summary, it is clear from the project record that Greens Creek Mine has caused environmental impact in Admiralty National Monument, particularly in Hawk Inlet and the freshwater environments surrounding the mine. This impact is at least partially attributable to

[100] Ensight 2020 at 7.
[101] *DSEIS* 2023 at § 2.4.4.3.

the wind-borne escape of metals-laden tailings from the dry-stack tailings pile. Metal loading as far away as 2,400 feet has been documented and observed. Two studies on lichen, conducted ten years apart, found that lead concentrations in lichens at Greens Creek are elevated.[102] As distance from the TDF increased, lead concentrations decreased. A sample over nine thousand feet south of the TDF had lead concentrations almost as low as USFS wilderness reference values.[103] In 2018, results of lichen sampling suggested, according to the Risk Characterization report (2020) no substantial differences in metals in lichens based on their direction from the TDF. This result clashes with results from ADP sampling, which shows strong depositional deposits to the south and west.[104] The discrepancy between results here underscores the need for a substantive dust monitoring and mitigation plan.

A formerly robust freshwater environment, Tributary Creek, has been at least partially contaminated with lead and is now listed as an impaired waterbody. Sediment monitoring has revealed elevated and increasing trends for metals including lead and zinc at most sampling stations, including stations that were originally described as "background" stations supposedly representative of baseline, pre-mining conditions. Aquatic organisms in both marine and freshwater environments have exhibited reduced populations and diversity, and higher metals concentrations in tissue from pre- to post-mining periods, even as currently defined, and despite not including information from the original 1981 baseline study. Marine organisms such as polychaete worms and mussels have exhibited trends of increasing lead concentration and decreasing abundance. Freshwater benthic organisms have decreased in Tributary Creek over time.

Due to the importance of Hawk Inlet both as it pertains to the ecology and health of the entire Admiralty National Monument and to its historic importance as a subsistence area, SEACC can only support an expansion of Greens Creek Mine's Tailings Disposal Facility if the Forest Service delivers on not only its own commitments for additional mitigation and monitoring as expressed in the 2023 DSEIS, but previously identified recommendations from facility audits and third-party reports that have not been adopted. These include recommendations to include data from, repeat, or replicate original baseline studies that were done in 1981 concerning metal levels in sediments and aquatic organisms, and species abundance and diversity in Hawk Inlet. Additionally, a separate Fugitive Dust Monitoring and Mitigation plan with specific modifications outlined in this comment should be in place before the Record of Decision is signed, not afterward.

[102] *Id.* at 27-30.
[103] *Id.* at 28.
[104] *Id.* at 29.

SEACC appreciates the opportunity to comment on the proposed expansion of the Greens Creek Mine Tailings Disposal Facility.

Respectfully,

Meredith Trainor, M.S.
Executive Director
meredith@seacc.org

Aaron Brakel
Inside Passage Water Program Director
aaron@seacc.org

Katie Rooks, M.S.
Environmental Policy Analyst
katie@seacc.org

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