Response to Comments

for

Department of Environmental Conservation
Waste Management Permit No. 2019DB0001
and
Department of Natural Resources
Reclamation Plan Approval No. J20185690RPA

Constantine Mining LLC
Palmer Project

Public Noticed April 16, 2019 – May 30, 2019

FINAL

October 4, 2022

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I. Introduction

The Palmer Project ("Palmer Project" or "Project") is a copper-zinc-silver-gold-barite prospect in the advanced exploration stage. The Project is operated by Constantine Mining LLC and located within the Porcupine Mining District in the Haines Borough. Roads connect the project area to the village of Klukwan, approximately 17 miles to the east, and the coastal town of Haines, approximately 35 miles to the southeast.

At the Project site, the proposed discharge consists of drainage from a one-mile-long adit (tunnel) as it is constructed to advance exploration of the ore body. Drainage from the tunnel will be collected, treated through a water treatment system located at the adit portal and designed for the removal of total suspended solids (TSS) using pH adjustment, flocculation, clarification, and filtration (Veolia Water Technologies Ltd, 2022). A settling pond system, also approved for construction and operation, will serve as contingency storage and treatment for TSS removal for periods of high flow. Based on the geochemical analysis of the host material, and the construction path of the adit as proposed by Constantine Mining, LLC, adit construction should result in minimal encounters with potential acid generating (PAG) rock and therefore PAG wastewater discharge. Discharge is approved through a Land Application Disposal (LAD) system located east of Hangover Creek. The permit lists constituents of concern (pollutants) associated with exploration activities and contained in wastewater generated by the mine drainage. The permit also includes monitoring and reporting requirements for each pollutant.

This document addresses comments received on Alaska Department of Environmental Conservation (DEC) draft Waste Management Permit (WMP) No. 2019DB0001 and Alaska Department of Natural Resources (DNR), draft Reclamation Plan Approval (RPA) No. J20185690RPA and summarizes public participation process developing those permits. The WMP regulates the containment and disposal of mine tailings, waste rock, wastewater, and other exploration-related wastes at the Project site, while the RPA regulates activities associated with the reclamation and closure of the project.

II. Comment Overview

The public comment period for the permits began on April 16, 2019 and ended on May 15, 2019. On May 20, 2019, the public comment period was extended from May 16 to May 30, 2019 for a total comment period of 45 days.

The State received a total of 218 comments, the majority of which were general comments that did not concern permit-specific requirements. Instead, general comments included objection to the project, support for the project, and concerns over the length of the public notice period or other aspects outside the scope of the permits. Since these general comments did not offer any specific points applicable to permit conditions, no changes to the permits were made.

Substantive comments concerning requirements of the WMP permit and RPA and the State's responses are contained in Section V. Where comments resulted in changes to the permits, the changes are noted in the response to the associated comments. There were also some minor changes made to the draft permits after public notice to correct typographic, transcription, and grammatical errors, formatting, and to clarify information. These minor changes to the permits are not detailed in this document.

III. 2019 Informal Review Request and Remand Decision

On August 6, 2019, the DEC Division of Water Director received six timely requests for informal review from the Center for Science in Public Participation (CSP2), Audubon Alaska, Takshanuk Watershed Council, Southeast Alaska Conservation Council (SEACC), and two private citizens. Of the six informal review requests, DEC determined that one request did not merit review. On August 16, 2019, requestors were notified whether their informal request had merit for further review.

On September 9, 2019, Director's informal review decision remanded the permit back to Division of Water staff for additional review, pursuant to 18 AAC 15.185(d)(2). The remand directed staff to:

1) Evaluate the applicability and potential implications of the Ninth Circuit Court *Hawai'i Wildlife Fund v. County of Maui* ruling ("*Maui*") regarding the appropriate wastewater discharge permit strategy.

2) Address a range of comments submitted during the public notice period, including an evaluation of the statistical methodology used to determine effluent trigger limits.

3) Update the Response to Comments document to reflect decisions made on previously submitted comments during the public notice period.

IV. 2019 Remand Evaluation

2019 Remand Directive 1

Evaluate the applicability and potential implications of the Ninth Circuit's decision regarding the appropriate wastewater discharge permit strategy.

In summary, requestors asserted the subsurface groundwater discharge authorized in 2019DB0001 was, or had potential to be, connected to waters of the United States (WOTUS) requiring a permit issued under Section 402 of the Clean Water Act. A central item of the remand was considering the potential implications, if any, of the U.S. Court of Appeals for the Ninth Circuit (Ninth Circuit Court) decision in *Hawai'i Wildlife Fund v. Cnty. of Maui*, 886 F.3d 737 (9th Cir. 2018) on the appropriate wastewater discharge permit strategy on the Project.

Ninth Circuit Decision

The court in *Hawai'i Wildlife Fund v. Cnty. of Maui* determined that a discharge may be connected to WOTUS if the pollutants are "fairly traceable" to the point source. The court held that if pollutants discharged to subsurface water migrated to WOTUS and were "fairly traceable" to a point source and in greater than *de minimis* amounts, then a Clean Water Act §402 permit (CWA) was required. The Ninth Circuit decision, however, was subsequently vacated by the United States Supreme Court. *See Cnty. of Maui, Hawaii v. Hawaii Wildlife Fund*, 140 S. Ct. 1462 (2020)

Supreme Court Overrules Ninth Circuit

The Supreme Court held that the Ninth Circuit's standard was too broad. The Supreme Court held that the CWA requires a permit when there is a direct discharge of pollutants from a point source or when there is a "functional equivalent" of a direct discharge. A discharge is the functional equivalent of a direct discharge "when the discharge reaches the same result through roughly similar means." *See Cnty. of Maui, Hawaii*, 140 S. Ct. at 1476.

The Supreme Court provided a non-exhaustive list of factors that may be relevant depending on the circumstances presented in each case, noting that the first two (*e.g.,* time and distance) factors would often be the most important. *Id*. at 1477. However, a final determination of functional equivalence is a comprehensive evaluation of potentially relevant factors including, but necessarily limited to:

1. Transit time
2. Distance traveled
3. The nature of the material through which the pollutant travels
4. The extent to which the pollutant is diluted or chemically changed as it travels
5. The amount of pollutant entering WOTUS relative to the amount of the pollutant that leaves the point source
6. The manner by or area in which the pollutant enters WOTUS
7. The degree to which the pollution (at that point) has maintained its specific identity

Discharge Analysis of the Palmer Project Based on the Supreme Court's Decision

A dye tracer study and a technical analysis of the results were performed to better understand the LAD discharge to the groundwater and the groundwater connection to Glacier Creek. The project proponent contracted Ozark Underground Laboratory, Inc. to conduct the dye tracer study which was completed over two phases (Phase 1 and Phase 2). In Phase 1, dye was introduced at the original lower diffuser LAD location (Phase 1 LAD) proposed in an earlier plan. For continuous capture of dye, Phase 1 involved placing carbon samplers at nine sites in Glacier Creek hydrologically downgradient from the Phase 1 LAD (Stations 1 through 9). Three trenches at the

Phase 1 LAD site were filled with equal volumes of the dye mixture, and each trench was flushed with 5,000 gallons of water. Phase 1 monitoring involved 21 events of carbon sample collection for laboratory analysis and replacement of carbon samplers over a period of 275 days. The results from Phase 1 provided hydrological information used to estimate travel time, distance and hydraulic conductivity of the groundwater aquifer and also indicated that the lower LAD system would be better located to the east across Hangover Creek. For Phase 2 of the study, the trenches were moved to a new proposed LAD site east of Hangover Creek (Phase 2 LAD). Analytical test methods between Phase 1 and Phase 2 were identical. However, during Phase 2, three times more dye was deposited in each trench, eight more sample sites for a total of 17 were installed (Stations 101 through 117), carbon samplers were collected, analyzed, and replaced 14 times, and the duration of monitoring was 350 days (Ozark Underground Laboratory, Inc., 2022.

Factor 1. Transit time. The Station 9 monitoring site is within Glacier Creek, about 3,900 linear feet from the Phase 1 LAD location. The Phase 1 tracer study results indicate a travel time between 42 days to 196 days.

In Phase 2, dye was introduced at the Phase 2 LAD location (northeast across Hangover Creek from the Phase 1 site). Phase 2 began on August 23, 2020 and continued until August 8, 2021, a total of 350 days. 17 stations hydraulically downgradient of the LAD were monitored to detect tracer dye. No dye from any of the Phase 2 LAD introductions were detected at any of the 17 monitoring stations throughout the duration of the Phase 2 study (Ozark Underground Laboratory, Inc., 2022).

The Moran (2022) report, representing a technical review of the *Dye Tracing Study for a Land Application Disposal (LAD) System for Constantine Mining – Palmer Project – Haines, Alaska*, was received by DEC from CIV on July 29, 2022. The Moran report concluded that travel times were 17 days to 142 days and generally agree with the travel times measured during Phase 1 of the tracer study.

Factor 2. Distance traveled. During Phase 1 of the dye tracer study, dye introduced at the Phase 1 LAD was detected at the Station 9 monitoring location, approximately 3,900 feet from where the dye was introduced. However, there were no detections of dye at Station 8, a monitoring station upgradient of Station 9 in Glacier Creek, approximately 930 feet from the Phase 1 LAD system. Phase 1 results indicate that the discharge intercepts Glacier Creek (WOTUS) somewhere between 930 feet and 3,900 feet because Station 9 detected tracer dye introduced to Glacier Creek between those points (Figure 11, Ozark Underground Laboratory, Inc., 2022).

During Phase 2 of the dye tracer study, 17 hydrologically downgradient monitoring stations ranging from approximately 900 feet up to 17,000 feet distance from the Phase 2 LAD location detected no traces of dye. The Phase 2 dye tracer results indicate that either the discharge from

the LAD is not connected to the dye tracer monitoring locations or that the dye was substantially diluted below detection limits by groundwater (Ozark Underground Laboratory, Inc., 2022).

Hydrogeological data and the dye study test results indicate that the discharge has a significant travel distance through soils prior to reaching WOTUS. The Phase 1 study indicates a travel distance to interception with WOTUS at some point between 930 and 3,900 feet from the Phase 1 LAD location. The Phase 2 study was inconclusive except to indicate that the travel distance from the Phase 2 LAD site to Glacier Creek intercept may be greater than 17,000 feet. Results of Phase 1 compared to Phase 2 indicate that the new LAD system site is better situated east of Hangover Creek (Figure 11, Ozark Underground Laboratory, Inc., 2022) than the older LAD system site between Waterfall Creek and the westside of Hangover Creek (Figure 4, Ozark Underground Laboratory, Inc., 2022) due to the greater travel distance before reaching WOTUS.

Factor 3. The nature of the material through which the pollutant travels. The stratigraphy of the Glacier Creek valley is complex. It is composed of layers of heterogeneous glacial till, alluvial fan, debris flow and lacustrine deposits. The thickness of unconsolidated soil above bedrock ranges from approximately 131 feet to 250 feet. Water level measurements in monitoring wells indicate a hydraulic connection between shallow and deep surficial deposits. The median depth to water in the LAD area is approximately 20m (66 feet) below ground surface. Based on hydrogeological findings, groundwater flow from the east bank of Hangover Creek is to the northeast, flow towards Glacier Creek and potentially turning east to flow approximately parallel, or parallel and beneath the creek for some distance before reporting to Glacier Creek. The mean values of hydraulic conductivity among all units are similar in the range of 1×10^{-4} m/s (31 feet/day). The hydraulic gradient throughout the Phase 2 Study Area was about 0.22 ft/ft, based on the most recent water level measurements reported by KCB Consultants Ltd (2022), with flow oriented down-valley towards the northeast (Ozark Underground Laboratory, Inc., 2022). As described in Moran (2022), using the hydrologic parameter values derived from the hydrogeologic study of the area, the calculated flow rates were in general agreement with the results of the Phase 1 dye tracer studies.

The subsurface material through which the discharge must travel through is a contributing factor that affects the rate of travel from the point of discharge, through groundwater and to WOTUS. The rate of travel due to the material properties is demonstrated in the Factor 1 analysis, which indicates the travel time from the Phase 1 study is between 42 days to 196 days and the Phase 2 study with a travel time greater than 350 days. The hydrologic properties of the subsurface material support the distance and time observations in Factors 1 and 2. DEC finds that the nature of the material through which the pollutant travels is a significant factor preventing a functionally equivalent direct discharge into WOTUS.

Factor 4. The extent to which the pollutant is diluted or chemically changed as it travels. The primary pollutant within the effluent is in the form of TSS derived from drilling and blasting activities associated with the adit construction and exploration. TSS carried by water flowing

from the adit may contain undissolved metals from mineralized rock. Nitrate is also a constituent of concern since it is a component of the explosives used for blasting.

The LAD is a subsurface disposal system and discharge to the LAD provides an additional level of treatment for TSS removal because subsurface material filters TSS. Also, subsurface materials remove constituents of concern through adsorption, and it presents a medium for microbial degradation and consumption of constituents of concern. Additionally, groundwater mixes with discharged wastewater offering significant dilution. Subsurface disposal through soil treats nitrate compounds through natural attenuation identical to how an onsite wastewater soil absorption system or leach field system treats domestic sewage. Subsurface materials and groundwater, therefore, provide significant dilution and natural attenuation of constituents of concern from the treated discharge before reaching WOTUS and in a manner that is not functionally equivalent to a direct discharge into WOTUS.

Factor 5. The amount of pollutant entering WOTUS relative to the amount of the pollutant that leaves the point source.

Prior to discharge, the permit requires construction and operation of a water treatment system that removes constituents of concern in the effluent. The water treatment system is located at the adit portal and is designed for the removal of TSS using pH adjustment, flocculation, clarification, and filtration (Veolia Water Technologies Ltd, 2022). A settling pond system, also approved for construction and operation, will serve as contingency storage and treatment for TSS removal for periods of high flow. The water treatment system decreases the amount of pollutant in the effluent prior to discharge and prior to entering WOTUS.

The permit requires groundwater monitoring wells located downgradient of the diffuser as well as a groundwater monitoring well located upgradient of the diffuser. The downgradient well monitors the groundwater quality to be compared to upgradient groundwater quality. Data from both wells are used to establish corrective action levels to protect water quality from negative impacts. Additionally, the permit established WOTUS sampling locations at nearby and downgradient locations for a similar comparison.

The amount of pollutant entering WOTUS is expected to be negligible and undetectable due to the efficacy of wastewater treatment prior to discharge, subsequent treatment by the subsurface material (Factor 4), and natural attenuation provided through subsurface disposal from the LAD system. The amount of pollutants that could reach WOTUS, therefore, are not functionally equivalent to a direct discharge.

Factor 6. The manner by or area in which the pollutant enters WOTUS. The LAD system is located near Hangover Creek and the head waters of Glacier Creek. Glacier Creek discharges into the Klehini River which then drains into the Chilkat River which ultimately discharges into the Chilkat Inlet and the Pacific Ocean. Any pollutant of concern would enter WOTUS from the LAD system via groundwater inflow to Glacier Creek. As described earlier in this analysis, the

effluent will be required by permit to be treated to meet groundwater quality standards prior to discharge and the travel time and distance, subsurface material, and groundwater provides for significant dilution and natural attenuation of pollutants from the treated discharge before reaching WOTUS. The concentration of pollutant entering WOTUS is expected to be negligible, if not undetectable, due to the efficacy of the wastewater treatment prior to subsurface discharge, additional treatment provided by the soil matrix, and natural attenuation of the subsurface provided by the LAD system and natural geology of the area.

Factor 7. The degree to which the pollution (at that point) has maintained its specific identity.

Influent from the proposed exploration activities of this project will undergo significant transformation before discharge by the active water treatment system (Factor 5) and after discharge through filtration and natural attenuation provided by subsurface disposal as described in Factor 4. Further, considering the travel time and distance described in Factors 1, 2 and 3, any remaining pollutants of concern in the treated effluent will be empirically undetectable at the location where it intercepts WOTUS due to natural attenuation. Reiterating the finding in the Factor 6 analysis, the concentration of pollutant entering WOTUS is expected to be negligible, if not undetectable, due to the efficacy of the wastewater treatment prior to subsurface discharge, additional treatment provided by the soil matrix, and natural attenuation of the subsurface provided by the LAD system and natural geology of the area.

Conclusion

It should be noted that the case reviewed by the Ninth Circuit and Supreme Court is factually dissimilar from the Palmer Project. The Palmer Project discharge is fully compliant with EPA-approved State Water Quality Standards which are designed to protect WOTUS. The Maui discharge, by contrast, discharged partially treated wastewater introducing chemicals that are otherwise naturally absent and, therefore, included impacts to the receiving aquatic environment that are not present with the Palmer Project (Glenn and others, 2013).

If the discharge does not connect to WOTUS in a functionally equivalent manner, a Clean Water Act §402 permit is not required. Considering the seven factors of functional equivalency identified by the Supreme Court, dye study results, technical analysis conducted on the hydrology of the area, environmental conditions of the project area, system design and effluent treatment, and unlikeliness of pollutants of concern reaching WOTUS in measurable concentrations, DEC concludes that a CWA 402 permit is not required for the discharge approved under this permit. DEC has also included a term in 2019DB0001 which specifically prohibits a discharge in any manner that forms a connection with WOTUS at Permit Part 2.2.3: "Land application discharge shall not create the functional equivalent of a direct discharge to surface water." By its terms, there is zero allowance for any wastewater discharged via 2019DB0001 to form the functional equivalent of a direct discharge to WOTUS.

2019 Remand Directive 2

Address a range of comments submitted during the public notice period, including an evaluation of the statistical methodology used to determine effluent trigger limits.

The range of comments received during the public notice period were reviewed, including an evaluation of the statistical methodology used to determine effluent trigger limits. Comment and Responses 32 through 40 were added to the July 17, 2019 responses after careful review of the submitted comments. Comment Response 5 was revised to expand on the statistical methodology used to determine effluent trigger limits.

2019 Remand Directive 3

Update the Response to Comments document to reflect decisions made on previously submitted comments during the public notice period.

Comment Responses 4, 5, 12, 13, 24, 30 and 31 were revised from the July 17, 2019 responses to add clarifying or additional explanation.

V. 2022 Adjudicatory Hearing Request and Commissioner's Remand

On August 24, 2022, Chilkat Indian Village (CIV) requested an adjudicatory hearing pursuant to 18 AAC 15.200. On September 6, 2022, Commissioner Brune denied CIV's request for adjudicatory hearing and request for stay of the May 27, 2022, Decision. Instead, the May 27, 2022 Decision was vacated and issues 2 and 3 in CIV's request for adjudicatory hearing were remanded to the Division for further consideration:

Under issue 2, the Division was instructed to evaluate whether the revisions to Appendix A require a new permit or an amendment, according to 18 AAC 15.100(c) & (d). This finding hinges on whether the LAD system revisions might result in increased emissions or discharges or might cause other detrimental environmental impacts.

Under issue 3, the Division was instructed to determine whether any of the revisions in Appendix A create a direct discharge, or the functional equivalent, into WOTUS based on the County of Maui decision. In so doing, the Division shall consider the report prepared by Dr. Jean Moran entitled Technical Report Analyzing Constantine Mining, LLC's Revised Application for Waste Management Permit for the Palmer Phase II Exploration Project near Haines, Alaska.

VI. 2022 Remand Evaluation

2022 Remand Directive 1, Issue 2

Determine and document the applicability of 18 AAC 15.100(c) & (d) to the plan approval of revisions to Appendix A.

Plan approval of revisions to Appendix A was conducted under the authority of Condition 2.4.5.2 of WMP 2019DB0001, which states, "Under 18 AAC 72.600, the permittee shall submit engineering plans to the department at least 60 days before construction or modification of an applicable system, and receive department approval of any changes that will significantly modify the quality or quantity of a waste stream, the operation of a wastewater treatment component, or the LAD system covered under this permit."

18 AAC 15.100(c) says, *"(c) A permit or variance authorizes only that operation specified in the permit or variance. Any expansion, modification, or other change in a facility process or operation which might result in an increase in emissions or discharges or might cause other detrimental environmental impacts from the permittee's facility, requires a new permit or variance. Any other change in the operation requires an amendment to the permit or variance."*

The plan approval will not result in an increase in discharge or cause detrimental impacts. Instead, the plan will reduce pollutant discharge and environmental harm for the following reasons. First, it employs a more comprehensive and effective system of active wastewater treatment than the previous plan, which offered only settling ponds as treatment.

The plan approves discharge into the LAD system from an engineered wastewater treatment system designed to remove TSS containing the metal constituents of concern using pH adjustment, flocculation, clarification, and filtration. The water treatment system has a greater treatment efficiency producing discharge water quality at or better than pre-development background and settling pond effluent water quality with a greater level of variable flow rate control than with the previously approved settling pond treatment relying on gravity separation only. Therefore, the concentration of pollutants from the water treatment system will be reduced compared to the previously approved plan.

Second, Condition 2.2.6.1 limits flow to the lower diffuser, Appendix A LAD system, to 500 gallons per minute. There has been no change to that limit. Since the concentration of pollutants is reduced and the approved flow rate remains the same, the overall pollutant discharge and environmental harm is reduced rather than increased. Thus, the new plan improves treatment without any increase in detrimental impacts producing the opposite effect of the concern presented and 18 AAC 15.100(c) clearly does not apply.

Under 18 AAC 15.100(d), "*An application for a renewal of a permit, or amendment to a permit or variance, will be treated in the same manner as the initial application, except that public notice or hearing will not be provided for applications for renewal or amendment. Application*

for renewal or amendment must be made no later than 30 days before the expiration of the permit or the planned effective date of the amendment. The department will, however, approve an amendment to a permit or variance on an emergency basis if necessary to protect public health, life, or property."

WMP 2019DB0001, which was subject to a full public participation process and is currently in effect, specifically sanctions department approval of changes to the LAD system (Appendix A) design in Condition 2.4.5.2.: "*Under 18 AAC 72.600, the permittee shall submit engineering plans to the department at least 60 days before construction or modification of an applicable system, and receive department approval of any changes that will significantly modify the quality or quantity of a waste stream, the operation of a wastewater treatment component, or the LAD system covered under this permit.*" The plan approval process involves no changes to permit terms. The submission containing revisions to Appendix A eliminates any cross-reference inconsistencies between the permit and Appendix A. Therefore, revision to Appendix A according to the existing permit does not require a new public comment process under 18 AAC 15.100(d).

2022 Remand Directive 2, Issue 3

Make a finding as to whether any of the revisions in Appendix A create a direct discharge or the functional equivalent into WOTUS under County of Maui. In so doing, the Division shall evaluate whether the report prepared by Dr. Jean Moran entitled *Technical Report Analyzing Constantine Mining, LLC's Revised Application for WMP for the Palmer Phase II Exploration Project near Haines*, is appropriate to consider

See *Section IV. 2019 Remand Evaluation* above. The Moran report was received by DEC from CIV on July 29, 2022, just prior to the CIV's request for an adjudicatory hearing. The report was reviewed and considered as directed by the Commissioner. Subsequently, relevant aspects of the report were cited in the analyses of factors 1 and 3 of 2019 Remand Directive 1.

VII. References Cited

KCB consultants Ltd. 2022. Palmer LAD Redesign – Hydrogeologic Site Investigation Summary. Report issued March 3, 2022 to Constantine Mining LLC. KCB project number UM100008A06.

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Moran, Jean E. PhD. 2022. Technical Report Analyzing Constantine Mining, LLC's Revised Application for Waste Management Permit for the Palmer Phase II Exploration Project near Haines, Alaska. Prepared for Chilkat Indian Village of Klukwan. July 15, 2022.

Ozark Underground Laboratory, Inc. 2022. Dye Tracing Study for a Land Application Disposal (LAD) System for Constantine Mining – Palmer Project – Haines, Alaska. Draft report issued February 27, 2020 to Constantine Mining LLC.

Veolia Water Technologies Canada. 2022. Process Overview – Total Suspended Solids Reduction Water Treatment for Constantine Mining LLC – Palmer Project. April 11, 2022, Revision 0, CA_02_22_424575.

VIII. Comments and Responses

Comment No.	Comment Summary	Agency Response
1	The application does not provide sufficient surface water quality data to establish an adequate baseline for natural conditions - groundwater wells were only sampled twice in an 11-day period, and many of the surface water monitoring sites were sampled only four times.	Regarding groundwater sampling covered in 18 AAC 60.830(f), it states, "Background data must be collected in each of the four seasons before waste is placed in the waste management area being monitored." The department added the most recent data and inserted recalculated triggers for MW-02 in the final permit satisfying 18 AAC 60.830(f). Surface water monitoring at the project began in 2014. Recent data from 2017 and 2018 were considered the most representative of current natural conditions. Background surface water triggers for sites P25 and P27 each used 10 samples taken during 2017 and 2018, while site P26 used 9 samples taken during 2017 and 2018. No permit change resulted from this comment.
2	The permit fails to demonstrate that the groundwater and surface water are not connected at the site of the Land Application Disposal (LAD) system diffusers.	The purpose of the permit is not to deny nor demonstrate connectivity between surface and groundwater. Under Permit Coverage in Condition 1.1 of the Waste Management Permit, it states, "This permit prohibits the discharge of wastewater to surface water." Additionally in Condition 2.2.3, it says, "Land application discharge shall not create the functional equivalent of a direct discharge to waters of the U.S." The permit goes on to establish background surface water quality triggers at three sites and monitoring at four sites to assure and document the absence of a surface water discharge. Furthermore, the permitted and approved LAD system discharges at least 6.6 feet below the ground surface. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
3	The application fails to adequately explain how the proposed discharge system and monitoring system will work in freezing temperatures or during periods of deep snow cover.	In Section 5.0 of Appendix A to the Waste Management Permit, it states that the Land Application Disposal (LAD) system piping and diffusers will be installed at a minimum depth of 6.6 feet. That is well below the frost line for protection from freezing. No permit change resulted from this comment.
4	There is potential for an avalanche to damage the wastewater settling ponds or fuel storage tank, resulting in an unpermitted release of wastewater or diesel fuel.	The Waste Management Permit does not account for acts of nature such as avalanches. However, snow reports are being employed in designing, placing, and constructing avalanche berms for the protection of life and property at the project site. • DNR and DEC requested more information regarding avalanche risk and mitigation in relation to the proposed surface infrastructure in Glacier Creek Valley. In response, the permittee, Constantine, submitted a memo addressing Avalanche Mitigation for Phase II – Palmer Project dated June 27, 2019, which satisfied agency concerns. See Attachment #2. • Conditions 2.2.4, 2.2.5.8, 2.4.2.1, 2.4.2.5, 2.4.2.7, and 2.4.5.2 of the WMP address SEACC concerns. Those conditions follow. • 2.2.4 Advancement of the exploration ramp shall cease before influent flow to the LAD system exceeds its maximum discharge capacity. • 2.2.5.8 Surface expression of wastewater discharge from the LAD system's upper diffuser is prohibited. • 2.4.2.1 Changes that may have a significant impact on surface or groundwater quality; information on engineering changes to the wastewater disposal systems that may affect water quality; new waste treatment processes; changes to ground and surface water interception, conveyance or monitoring systems; or the addition of new waste streams to the discharge that could significantly change the quality or increase the quantity of pollutants in a waste stream must be submitted to the department and approval must be obtained prior to any such changes or discharges.

Comment No.	Comment Summary	Agency Response
		• 2.4.2.5 The permittee shall not dispose of PAG rock or wastewater in quantities exceeding the design capacity of the disposal facilities. • 2.4.2.7 The LAD system and its appurtenances shall be properly operated and maintained. • 2.4.5.2 Under 18 AAC 72.600, the permittee shall submit engineering plans to the department at least 60 days before construction or modification of an applicable system and receive department approval of any changes that will significantly modify the quality or quantity of a waste stream, the operation of a wastewater treatment component, or the LAD system covered under this permit. No permit change resulted from this comment.
5	The trigger detection levels for all the constituents except for mercury and pH are at, or greater than, the Alaska water quality standard for that constituent. Trigger levels should be significantly less than the applicable water quality standard to allow some time for the triggered action to keep the contaminant from exceeding the water quality standard. If the trigger level is, or exceeds, the water quality standard, then likely there will be a violation of that standard. Trigger levels should ideally be set to protect background water quality, since there is to be no discharge to surface waters. However, trigger levels appear to be aimed at protecting surface waters not at background, but at state water quality standards. Why is background water quality not being protected if there is to be no discharge to surface waters?	DEC established corrective action triggers (triggers) based on the natural conditions of the water quality at the site prior to discharge. Natural water quality typically fluctuates seasonally. To establish baseline background water quality, DEC evaluated site-specific data submitted by the applicant and used these data to determine a baseline water quality value indicating a statistically significant increase on a parameter-by-parameter basis. This was done at four strategically located monitoring sites in discharge area. The procedure for calculating a statistically significant increase, which triggers corrective actions according to 18 AAC 60.800 – 18 AAC 60.860, can be found in Attachment 1. When the natural condition of water of the state is lower quality than the criteria set out in 18 AAC 70.020(b), the natural condition supersedes the criteria. For parameters at the Project where DEC determined that the conditions were of lower quality than the criteria set out in 18 AAC 70.020(b), DEC established triggers to protect against a statistically significant increase of a pollutant concentration above the natural condition and clearly distinguishable from the seasonal and annual variation of water quality. In cases where natural conditions do

Comment No.	Comment Summary	Agency Response
		not meet the water quality standard criteria of 18 AAC 70.020(b), trigger limits were established at levels that exceed the criteria and account for natural variations in water quality. When the natural condition is less that a criterion set out in 18 AAC 70.020(b), the criterion signifying protection of all existing, designated, and beneficial uses is employed at the corrective action trigger. DEC imposes permit conditions to monitor water quality upgradient and downgradient of the proposed discharge and to report these values. Water quality data provided by permit requirements enables DEC and permittee to evaluate any negative trends of changes in water quality parameters, determine if any change is statistically significant, and protect all existing, designated, and beneficial uses of the water. Exceedances of established triggers at any downgradient monitoring site requires the permittee to comply with Section 2.7 of the permit to inform DEC of the exceedance, develop a plan address the situation and to prevent recurrences, and receive DEC approval. Triggers for the four specified monitoring locations are based on pre-development water quality data. The triggers were calculated to establish the threshold for each parameter of concern identifying what is a statistically significant increase over the background conditions (Attachment 1). Project site-specific background data were used to calculate the permit triggers, and the statistical analysis on the data set accounts for annual seasonal variation in water quality. The triggers protect water quality by preventing a discharge from exceeding a water quality standard (WQS) for parameters naturally below WQS or from exceeding the natural water quality condition of project site for parameters that naturally exceed WQS. In all cases of permit compliance, the discharge parameter concentration will be indistinguishable from background conditions at any downgradient

Comment No.	Comment Summary	Agency Response
		location from the authorized discharge site and by extension, all downgradient water uses are protected by the permit-authorized discharge. No permit change resulted from this comment.
6	The ML for aluminum is equal to the associated water quality standard. The minimum level of quantification for aluminum needs to be lower than the standard itself. Since several pH measurements from the P25, P26, and P27 have been less than pH = 7, the lower aluminum limit of 0.087 mg/L could apply. It is always appropriate and wise to take surface water quality samples for both dissolved and total constituents, as was done with the background data. This is important for aluminum since the published standard is for dissolved.	Aluminum's minimum level of quantification (ML) is set 87 µg/L to provide a frame of reference regarding the most stringent potentially applicable Water Quality Criterion. The most stringent applicable aluminum water quality criterion is published in total recoverable, and it does not offer a coefficient to transform a total recoverable concentration to a dissolved concentration. No permit change resulted from this comment.
7	There is no discussion of the potential post-closure discharge from the portal. The inclined workings will have a potential hydraulic head of 170 meters on the portal plug. It is very likely that there will be a significant amount of seepage around this plug, despite grouting efforts. It is not reasonable to assume no seepage around this plug. What would the water quality of this seepage be? What is the likely flow?	In Table 10 of Appendix C (page 11), Constantine is basing the costs for design and installation of a plug under the assumption of 232 psi of head pressure, requiring a plug approximately 30 feet in length. Prior to permanent closure the Reclamation Plan calls for an updated water management plan and detailed design of the portal plug to be developed from information gathered throughout the exploration project. Financial assurance is also provided for the detailed design and construction of the portal plug. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
8	In the estimates for Indirect Costs for the Cost Summary, all the estimates were chosen at the low end of the recommended ranges from ADNR. For small projects, and for projects off a road system, higher-end cost estimates should be used. This project meets both criteria, yet the cost estimates adopted by the applicant are low-end costs. The Indirect Costs associated with the Closure Summary should be significantly higher than assumed by the applicant. The choice to use low-end cost is not justified by the applicant.	The project is accessed by roads developed for timber harvest truck traffic directly connected to the Haines Highway and is on a road system. Therefore, higher-end indirect cost estimates are not justified. Additionally, on pages 2 and 3 of the Reclamation Plan in Appendix C, Constantine provides a detailed listing of the reasoning for selecting the indirect percentages, including that several costs are already included as a part of direct costs. Based on the information provided and other similar projects, DNR has found the costs sufficient. No permit change resulted from this comment.
9	A 3D model of the diffusers is desired to fully understand the potential boundary and interception points between non-domestic wastewater discharge and waters of the U.S., including streams. Item 2.2.3 of the Draft DEC WMP states, "Land application discharge shall not form a connection with waters of the U.S." However, BGC's 2D models show discharged waters reaching Glacier Creek.	There are no regulations requiring or precedents suggesting that 3D models be used. Section 5.0 of Appendix A describes land application. Section 5.2 provides that the conceptual design uses a factor of safety equal to 5. Glacier Creek was set as the downstream boundary and from Section 5.3.2 of the final LAD design, the upstream and downstream vertical model face, as well as the bottom of the model, were set as no flow boundaries. No permit change resulted from this comment.
10	Sec. 2.2.5.8 states that "Surface expression of wastewater discharge from the LAD system's upper diffuser is prohibited." Surface expression of wastewater may not be visible under a cover of snow. For this reason, the 120-day trial period (Sec. 2.2.5.5) should only take place when the area is free of snow cover. Furthermore, monitoring (Sec. 2.5) should include requirements to visually inspect the area in the spring for presence of aufeis that could indicate surface expression of the discharge.	Condition 2.2.5.5 of the final permit was changed to reflect the suggestion in this comment, and Condition 2.5.1 has been changed to reflect the suggestion in this comment.

Comment No.	Comment Summary	Agency Response
11	Sec. 2.2.6.1 limits flow to the lower diffuser to 800 gpm. BGC's model simulated a total infiltration capacity of 800 gpm. However, BGC LAD design is based on 500 gpm. Authorizing a higher discharge of 800 gpm would exceed the planned system design flow rate of 500 gpm.	The LAD design for the lower diffuser indicated 1) settling pond design for a flow rate of 500 gpm, and 2) an infiltration capacity of 800 gpm. The lower diffuser is limited by the design capacity of the settling ponds, and the Condition has been changed to the following. “Flow to the lower diffuser is limited to 500 gpm.” No permit change resulted from this comment.
12	Sec. 2.2.9 refers to monitoring of P27. Should this be POI?	The reference to monitoring station P27 in Permit Condition 2.2.9 is correct. No permit change resulted from this comment.
13	The location of PO1 is not ideal because it does not capture all the project's waters. A monitoring site below the confluence of Glacier Creek and Hangover should be established to monitor overall project effects to water quality.	Monitoring station P01 provides background water quality upstream of the project that may affect downstream monitoring results. No permit change resulted from this comment.
14	Sec. 2.4.2.4: Besides concerns of liner integrity due to removal of settled solids, stipulations should be added to monitor the depth of settled solids and triggers on when to initiate solids removal. Typically, storm water best management practices require the removal of settled solids when they reach l/3 pond volume. It seems like following such practice would greatly diminish the storage capacity of the sediment ponds.	The following Condition has been added to the final permit in response to your concern. "2.4.2.7 The LAD system and its appurtenances shall be properly operated and maintained."
15	Sec. 2.5.1: Visual monitoring should include signs of sheen on the water at the ponds, groundwater and surface water samples, and actions to report such observations.	Condition 2.5.1 of the final permit was changed to reflect the suggestion in this comment.

Comment No.	Comment Summary	Agency Response
16	Sec. 2.5.5.2: Should this be Pl, P25, and P26 ... not P27? Also note, Pl vs POI - these labels should be consistent.	The final permit has been changed to the following: "2.5.5.2 Surface water must be sampled at the following sites: P01, P25, P26, and P27 and meet the requirements in Table 5."
17	In the event of an emergency spillway discharge, water samples should be collected during the discharge at the emergency spillway, and at POI.	A spill is an unpermitted activity, and each emergency must be handled on a case-by-case basis by the department's Divisions of Spill Prevention and Response. No permit change resulted from this comment.
18	Sec. 2.5.5.2 and 2.5.5.4 refer to table 3, but this should be table 5 as it refers to the minimum limits of quantification for laboratory analysis.	The final permit has been corrected as indicated.
19	Sec. 2.5.5.5, table 5, establishes minimum sampling frequency as "quarterly". Considering the poor water quality characterization for the project in terms of existing baseline, and water quality predictions, and the ramp construction duration of 18 months, a quarterly sampling frequency is highly inappropriate. Monthly monitoring must be the minimum sampling frequency, and quarterly sampling could be considered by DEC after completion of construction of the ramp, once more water quality data is available for review.	The LAD system serves to dispose of wastewater encountered during adit construction. Consequently, it must be installed before the adit begins. Regarding quarterly monitoring frequency, it is consistent with groundwater monitoring frequency requirements in all similar permits. Groundwater flow rates lack the dynamics of surface water flow rates. Considering hydraulic conductivity and transmissivity rates compared to surface water flow rates, quarterly monitoring frequency is adequate. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
20	Sec. 2.9.2 established a WMP permit period of "five years" and options for future permit renewals. BGC's LAD design includes the statement "Management of water flow beyond the 3-year exploration activities are outside the scope of this design". This statement was made in relation to the lack of sedimentation loading data in the discharge. The permitted activity must not exceed the engineer's design parameters of the LAD system. If the LAD engineer is unable to justify proper system operation beyond the three-year operation at this time, the WMP should add a condition to limit operation of the LAD to three years. This should allow Constantine enough time to gather the necessary sediment load data, which could be used by BGC or another engineering firm to evaluate LAD system functionality beyond the three years. If practical, Constantine could then request an extension from DEC for LAD operation.	The following Condition has been added to the final permit in response to your concern. "2.4.2.7 The LAD system and its appurtenances shall be properly operated and maintained."
21	The Wastewater Discharge System Design Report (Waste Management Permit Appendix A; page 8) shows groundwater connectivity and the Waste Management Plan (Waste Management Permit Attachment 2; page 6) predicts contamination of water from wastewater and waste rock. Considering the anticipated contamination of water quality in permit documents, more information should demonstrate how the proposed LAD system removes contaminates like aluminum, manganese, vanadium, nitrate, nitrite, and selenium before reaching protected ground and surface waters and how the system and receiving ground and surface waters responds to different levels of contaminates and volume of water moving and diffusing through the underground pipes.	The permit is designed to prevent pollutants from the wastewater from impacting subsurface water. Prior to discharge into the LAD system, wastewater is treated to remove total suspended solids, which contain the metal constituents of concern. The removal of pollutants will primarily be accomplished by the water treatment system as described in Veolia Water Technologies Ltd. (2022) which has a treatment efficacy to produce discharge water quality at or better than pre-development background water quality. The treated effluent then enters groundwater and flows through the subsurface which offers further treatment through filtration, dilution, and natural attenuation prior to reaching surface water. The resulting concentration of pollutants from the discharge is expected to be negligible, if not undetectable prior to intercepting surface water. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
22	Constantine Mining LLC seems to be choosing too few locations and potentially inappropriate locations for its groundwater monitoring program.	The permit requires monitoring sites that will provide representative samples of downgradient water that are likely to capture detection of the permitted discharge. Selection of the number and location of monitoring sites are site-specific and are based on the primary pathways to surface water relative to the discharge location for the purpose of minimizing the likelihood that the discharge could reach surface water without detection. The number of monitoring sites established for this project is consistent with permit-required monitoring programs issued for similar facilities across the state. No permit change resulted from this comment.
23	The project applicant is proposing to forgo the scheduled monitoring events during high flows (Monitoring Plan Sec. 1.1.2) and during the months with snow, when the road is impassible (Reclamation Plan Appendix C; page 6). If people are not able to monitor for exceedances to water quality during these periods, then some form of applicable remote monitoring should be considered, or alternative locations for the wastewater treatment facility and waste rock storage areas should be analyzed.	Section 1.1.2 of the Monitoring Plan, Attachment 1 to the Waste Management Permit, refers to safely measuring surface water flows in Hangover, Waterfall, and Glacier Creeks by avoiding dangerously high flows. The Waste Management Permit allows discharge wastewater through the LAD system at least 6.6 feet below the ground surface, and it requires at least quarterly water quality monitoring. Groundwater flow rates lack the dynamics of surface water flow rates. Considering hydraulic conductivity and transmissivity rates compared to surface water flow rates, quarterly monitoring frequency is more than adequate, and it is reasonable to assume that the exploration site will be accessible at least once a quarter. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
24	Small amounts of copper can disrupt a salmon's sense of smell.	Copper contained in the discharge are naturally occurring from contact with copper-bearing minerals. The permit prevents the discharge of copper in concentrations that represent a statistically significant increase from background levels. Therefore, salmon, and other aquatic life will not be affected by the discharge authorized under this permit. Lastly, the Waste Management Permit allows discharge to groundwater and prohibits the functional equivalent of a direct discharge of wastewater and surface water. No permit change resulted from this comment.
25	The LAD system may not be designed to handle 100% of predicted wastewater flows from the full length of the proposed tunnel (i.e., beyond the Kudo Fault zone).	Exploration activities involve a great deal of uncertainty. As wastewater flows increase incrementally with adit length, the permittee will have to manage the inflow of water to the adit to stay within the permitted limits. Predicted wastewater flows have been maximized for this reason. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
26	The Care and Maintenance Plan (Reclamation Plan Appendix C) for the temporary closure scenario states that the applicant will “continue to perform all maintenance, monitoring and reporting tasks that are necessary to protect public health and the environment during the temporary closure” (page 3), but the cost estimates assume biweekly inspections during 6 snow free months and when access road is passable" (Table 3, page 5). How will waste water be managed during months where snow accumulations inhibit access under a temporary closure scenario, and what are the estimated costs for all maintenance, monitoring, and reporting tasks during such scenario?	Condition 2.8 SUSPENSION OF OPERATIONS of the Waste Management Permit addresses these temporary closure concerns with the following Conditions. "2.8.1...The permittee shall submit a conceptual suspension of operations plan to the department either (i) 90 days after the effective date of the permit or (ii) 90 days prior to commencing phase II exploration, whichever is later."" 2.8.3 2.8.3 No later than ten days after operations have been suspended, the permittee shall submit a detailed and updated suspension of operations plan that supersedes the suspension of operations conceptual plan required by Condition 2.8.1 with current information and specific details. The suspension plan shall address the following: “2.8.3.3 Procedures, methods, and schedule to be implemented for the treatment, disposal, or storage of wastewater;" No permit change resulted from this comment.
27	The applicant should relocate the mid-Glacier Creek monitoring station currently designated P-27. This site will not detect any significant change in water quality, over time, that may be coincide with Constantine’s underground exploration activities because of the upstream influence of Oxide Creek.	Stations upgradient of P27 offer information necessary to adequately protect those areas. Site P27 is properly situated downgradient of Oxide Creek and downstream of all permitted activity to monitor the cumulative impact of exploration activities and wastewater discharge on offsite water quality. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
28	Changes from compaction of the ground under the avalanche diversion structures could change the percolation rate near the lower diffuser locally and the performance of the LAD. Loading and stability issues under large rock structures could alter the hydrology and direction of groundwater.	Final design, number and location of the avalanche berms is yet to be determined. If hydrology changes necessitate physical modifications to the LAD system, the permittee must develop a construction plan. It must be submitted and approved under Condition 2.4.2.1 of the Waste Management Permit, which follows. "2.4.2.1 Changes that may have a significant impact on surface or groundwater quality; information on engineering changes to the wastewater disposal systems that may affect water quality; new waste treatment processes; changes to ground and surface water interception, conveyance or monitoring systems; or the addition of new waste streams to the discharge that could significantly change the quality or increase the quantity of pollutants in a waste stream must be submitted to the department and approval must be obtained prior to any such changes or discharges." No permit change resulted from this comment.
29	The Reclamation Plan does not discuss what happens to the material in the settling ponds upon permanent reclamation of the project.	This information is discussed on Page 13 of Appendix C under the notes for the Cost for Removing Settling Ponds on Table 14. Ponds shall be reclaimed by pushing the liners into the center of the ponds, then burying with clean fill, recontouring to prevent ponding, and reseeding. No permit change resulted from this comment.
30	The applicant estimates two years to construct the avalanche deflection berms. How will the permitted facilities be protected from avalanches during that time?	The following Condition has been added to the final permit in response to the concern raised in the comment. Permit Part 2.4.2.7 now states, “The LAD system and its appurtenances shall be properly operated and maintained."

Comment No.	Comment Summary	Agency Response
31	An anti-degradation review is required for any discharge into existing groundwater.	An antidegradation review for the discharge authorized in this permit is not required. Groundwater quality is protected by prohibiting statistically significantly increases of constituents over their background concentrations. Therefore, the permit prohibits degradation of groundwater quality, thus satisfying the department's Antidegradation Policy at 18 AAC 70.015. Additionally, under 18 AAC 70.016, the department will make an antidegradation analysis and findings for discharges subject to authorization by the department under 18 AAC 83, Alaska Pollutant Discharge Elimination System (APDES) Program; and under 33 United States Code (USC) 1341 (Clean Water Act, Section 401 water quality certificates of a Clean Water Act, Section 404 permit). Since this permit is neither a permit issued under the APDES Program nor a Clean Water Act, 401 certification of a Clean Water Act, Section 404 permit, the department's antidegradation implementation methods do not apply. No permit change resulted from this comment.
32	SEACC contests DEC's failure to correct the record reflected in the final permit describing monitoring station P25 "at the mouth of Waterfall Creek." The Surface Water Monitoring Plan at 6.3 still indicates P25 is located part way up Waterfall Creek above the road. DEC failed to correct the final permit in response to SEACC's timely submitted comments.	The location of P25 remains unchanged. However, the permit text has been amended in two places and now reads as follows, "P25 in Waterfall Creek downgradient of the LAD system's upper diffuser."

Comment No.	Comment Summary	Agency Response
33	Explosives will have adverse impacts on wildlife during winter months. The Department should require Constantine Metals LLC to consult with the Alaska Department of Fish and Game about these potential impacts, not a third-party wildlife research entity with limited experience in the region. The Takshanuk Watershed Council addressed wildlife concerns with regional wildlife biologists with Alaska Department of Fish and Game. According to their comment letter, ADF&G was unaware of the use of explosives or other "mechanical triggers" that will be used in the area, but did say that mountain goats, wolverines, and lynx all make use of the area during winter months.	This comment involves ADF&G and wildlife concerns which are beyond the scope and authority of the WMP. No permit change resulted from this comment.
34	The bonding for permanent closure of $1,001,542 is insufficient. Given the potential risk of generating acid mine drainage in perpetuity; given the risk of a failing adit plug in perpetuity; given the company's own prediction of the surface flows at the portal will be at "de minimis levels", rather than eliminated altogether, therefore the bond needs to be much higher. SEACC contests the agency's decision not to require additional financial assurances to cover maintaining and operating the wastewater treatment and disposal system after closure.	The reclamation and closure plan were reviewed and approved by DEC and DNR and the bond amount reflecting an estimate of those costs were reviewed and approved in accordance with standard operating procedures and are consistent with the State financial responsibility authorities. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
35	Seepage rate certainties are critical before wastewater management plans can be developed. An "order of magnitude" in design calculations is significant. The proposed 6000' long adit is going to cross many fractures and eventually the Kudo fault line. The combination of these could cause unpredictable seepage rates that may well overwhelm the proposed design of the wastewater management plan. Ceasing the further development of the adit may not stem the flow of existing seepage water. Is there a contingency plan for this possibility? The LAD system is not designed to handle 100% of predicted wastewater flows from the tunnel. From ADEC's RTC #25: "Exploration activities involve a great deal of uncertainty. As wastewater flows increase incrementally with adit length, the permittee will have to manage the inflow of water to the adit to stay within the permitted limits. Predicted wastewater flows have been maximized for this reason. No permit change resulted from this comment." ADEC is assuming that the permittee will have control over the amount of water entering the tunnel and exiting via the wastewater system. From the WMP Application Attachment 2, page 10: "the estimate [of inflow] can still have a range that is as large as an order of magnitude." The permittee is unlikely to have a high level of control over the situation. The LAD system should be designed to handle 100% of predicted wastewater flows.	The department acknowledges that exploration activities involve site condition uncertainty, that wastewater flows increase incrementally with adit length, and that groundwater through fracture bedrock is difficult to accurately predict. The permittee will have to manage the inflow of water to the adit to stay within the permitted limits. The design criteria for this proposed facility used maximized estimates for wastewater flow prediction to address uncertainty in the estimate. Additionally, Permit Condition 2.1.1.5 requires additional review and approval from the department if wastewater flows exceed permitted design criteria. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
36	We request that the Department make a legal justification as to why a National Environmental Policy Act (NEPA) review has not been requested due to the right-of-way requirements of this process. Please explain why a NEPA review is not required for the activities outlined in this permit application. Constantine has placed all their surface facilities for the proposed operation solely onto Mental Health Trust lands which is considered state lands and thus regulated solely by State of Alaska. Thus, a NEPA Environmental Impact Statement (EIS) is not required. However, federal public lands are very near the project and there are potential negative side effects of this mining operation downstream to the ocean. Since this appears to be a preliminary mine operation that is likely to become a full-scale operating mine it would be prudent to require either an EIS or something equivalent if it is to be managed solely thru the state of Alaska. And the EIS should consider impacts not only on State Lands but all lands and waters downstream.	NEPA is federal legislation, and it is only administered by federal agencies. DEC is a state agency and lacks the authority to administer a review under NEPA. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
37	The Permit Fails to Adequately Control Nitrogen Compounds (Contested Term or Condition: 2.1.1.2 – Implementation of BMPs to Control Nitrates). SEACC contests DEC's decision to ignore the potential of nitrogen containing compounds (nitrate and ammonia) from explosives to exceed water quality criteria for the protection of ground and surface water resources as submitted in our comments. Groundwater is protected under 18 AAC 70.016 for the designated uses of drinking water and industrial water. See also 18 AAC 60.215(a)(5). Exceedances of nitrate compounds may lead to eutrophic conditions in the settling ponds and LAD as these compounds are nutrients. Without sufficient credible data to conduct a Natural Conditions Assessment, DEC lacks a basis in the record for setting trigger levels for nitrogen compounds.	Through required monitoring, reporting, and limits, the WMP protects all beneficial uses affected by nitrates. Nitrate limits are established in Permit Tables 1 – 4 and are based on water quality criteria at 10 mg/L. No permit change resulted from this comment.
38	PAG Segregation - Constantine states that "Constantine personnel" will segregate PAG rock based on visual examination and that PAG rock will be identified by greater than 2% sulfide present in the rock. DNR should require that the "Constantine personnel" be college degreed geologists trained in identifying sulfide minerals and percentage estimates. Also, periodic, unannounced inspections should be performed by DNR to confirm their rock segregation by both visual inspection and geochemical analysis. How will leachate from the PAG waste rock piles be treated and disposed?	As this is a geological exploration project for the purpose of characterizing the mineral potential and environmental background of the project area, the endeavor is conducted, overseen, and performed by in large part by qualified geologists. Further, Permit Condition 2.3.3 of the WMP requires, "PAG rock must be covered by an impermeable cover when not being handled." This will minimize if not eliminate PAG leachate. Additionally, Permit Condition 2.3.5 states, "PAG storage pad water must be contained in the lined area and may not be discharged without written department approval." This allows evaluation of the water quality and appropriate treatment before disposal. No permit change resulted from this comment.

Comment No.	Comment Summary	Agency Response
39	The proposed Wastewater Plan is an attempt to circumvent the legal requirement for obtaining a valid APDES permit for a point source discharge at the mouth of the company's adit. The APDES permit would ensure the public of a clean wastewater discharge and consequently, not adversely affect the environment or endanger the public's health. Instead Constantine proposes to take a manageable and containable point source discharge (seepage water), dump it untreated into the ground/groundwater, thereby causing immediate groundwater degradation that is likely to emerge from the talus surface downslope of their diffusers as uncontainable and unmanageable non-point source pollution which then flows into the adjacent surface "Waters of the US", which then flows into Glacier Creek (a Water of the US), which then flows into the Klehini River (a Water of the US) and an anadromous river.	The department asserts that this WMP is the appropriate permit for this discharge and that this permit is compliant with its governing authorities including 18 AAC 15, 18 AAC 60, 18 AAC 70, 18 AAC72 and AS 46.03.100. The concerns raised in this comment were considered by the department and it was determined that the discharge, regulated under this permit is appropriate. See Response to Comment Section IV - Remand Directive 1 for analysis. No permit change resulted from this comment.
40	The Department should require Constantine Metals LLC to conform to the Department's regulation guidelines: "A minimum data set consisting of 10 valid data points within the last five years is necessary to perform a valid statistical analysis. Limiting data to the last five years ensures data is timely and relevant to the current analysis." See Reasonable Potential Procedure for Water Quality Based Effluent Limits Development Guide at 4 (Jan. 2009).	The guidelines referenced and recommended in the comment apply to APDES permits and are not applicable to the WMP. No permit change resulted from this comment.

Attachment #1 - Setting Triggers to Determine a Statistically Significant Increase for Background Water Quality Constituents

SETTING TRIGGERS TO DETERMINE A STATISTICALLY SIGNIFICANT INCREASE FOR BACKGROUND WATER QUALITY CONSTITUENTS

DEC established corrective action triggers (triggers) based on the natural conditions of the water quality at the site prior to discharge. Natural water quality typically fluctuates seasonally. To establish baseline background water quality, DEC evaluated site-specific data submitted by the applicant and used these data to determine a baseline water quality value indicating a statistically significant increase on a parameter-by-parameter basis. The procedure for calculating a statistically significant increase, which triggers corrective actions according to 18 AAC 60.800 – 18 AAC 60.860.

When the natural condition of water of the state is lower quality than the criteria set out in 18 AAC 70.020(b), the natural condition supersedes the criteria. For parameters at the Project where DEC determined that the conditions were of lower quality than the criteria set out in 18 AAC 70.020(b), DEC established triggers to protect against a statistically significant increase of a pollutant concentration above the natural condition and clearly distinguishable from the seasonal and annual variation of water quality. In cases where natural conditions do not meet the water quality standard criteria of 18 AAC 70.020(b), trigger limits were established at levels that exceed the criteria and account for natural variations in water quality. When the natural condition is less that a criterion set out in 18 AAC 70.020(b), the criterion signifying protection of all existing, designated, and beneficial uses is employed at the corrective action trigger.

Steps for establishing “triggers” that initiate corrective action based on down gradient monitoring:

1. Baseline data
   1.1. Collect all baseline data from downgradient wells. Data is considered baseline until wastes are placed in the impoundment.
   1.2. For each parameter at each well, the data set ought to span at least two years and contain at least 20 measurements.
   1.3. For each parameter, calculate the average and the standard deviation of the data set for each well. In doing this, replace non-detect readings with 0.5 times the Method Detection Limit (MDL).
   1.4. Calculate the tolerance interval at 95% probability and 95% coverage. Calculating the tolerance interval is a very simple process. The only statistical analysis that is required is calculating the mean ($\bar{x}$) and standard deviation (s) of the background data set. The upper limit of the tolerance interval (UTL) is then calculated as

$$UTL = \bar{x} + (s)(K)$$

The value K is determined from the attached table and is based on the number of data points and the desired probability and coverage.

2. Pond water quality (actual impounded water quality)
   2.1. Calculate the averages of current water quality data for each parameter in the pond in the same manner as step 1.2.
   2.2. Search for maximum contrasts between impounded and monitoring well water chemistry. Select those parameters where the average concentration in the pond is significantly greater than in the wells considering both the magnitude and proportion of the differences.

2.3. Select the parameters in the pond that are unique to the process, even if they are non-detect in the wells. Potassium, sodium, nitrogen, copper, TDS, sulfates, and WAD cyanide could be typical examples.

3. Choose trigger parameters and concentrations
   3.1. Choose the analytical parameters for each well based on being significantly higher in the pond or unique to the process from steps 2.2 and 2.3 above.
   3.2. For each analytical parameter in each well, establish the trigger for corrective action as the 95% upper tolerance interval even when that limit is less than the water quality standard. When the minimum level of quantification for a test method (ML) is greater than the tolerance interval, use the ML as the trigger level. Otherwise, use the tolerance interval as the trigger. This establishes statistically significant increase thresholds indicating leakage from the impoundment.

4. Implement the triggers in a permit, certification, or approval
   4.1. Revise the monitoring plan and associated reporting to focus on the selected suite of trigger parameters. Additional parameters will still be required for determining hardness, doing Piper plots, collecting field measurements, or for other reasons.
   4.2. If a well water sample exceeds the trigger concentration, it indicates a statistically significant increase, and the corrective action section of the permit must be initiated.

5. Another statistical method may be chosen in accordance with 18 AAC 60.830.

Tolerance Factors (K) for One-Sided Normal Tolerance Intervals
With 95% Probability Level and 95% Coverage
(From USEPA "Statistical Analysis of Monitoring Data, Interim Final Guidance", April 1989)

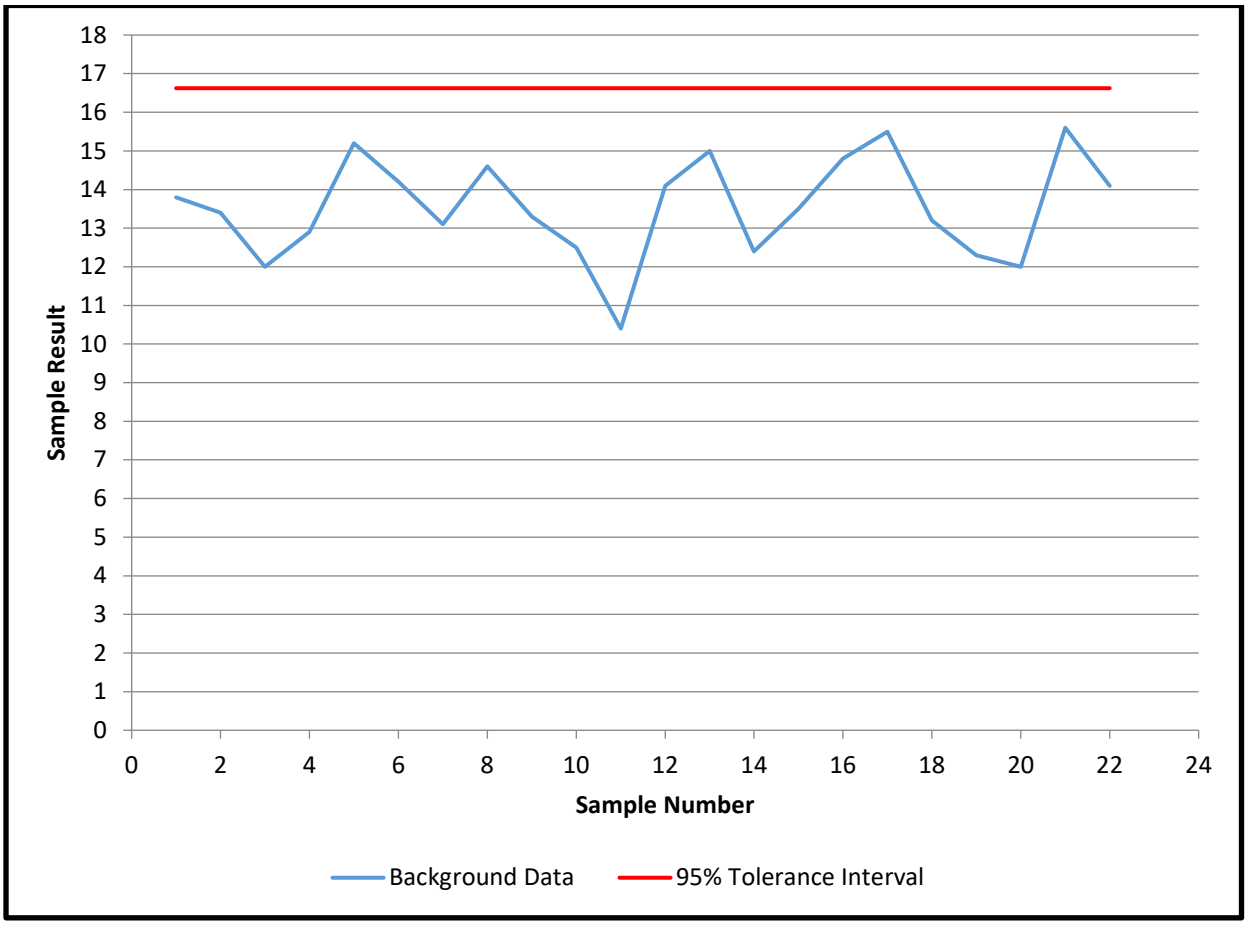
n	K	n	K
3	7.655	150	1.868
4	5.144	175	1.850
5	4.203	200	1.836
6	3.708	225	1.824
7	3.399	250	1.814
8	3.188	275	1.806
9	3.031	300	1.799
10	2.911	325	1.792
11	2.815	350	1.787
12	2.736	375	1.782
13	2.671	400	1.777
14	2.614	425	1.773
15	2.566	450	1.769
16	2.524	475	1.766
17	2.486	500	1.763
18	2.453	525	1.760
19	2.423	550	1.757
20	2.396	575	1.754
21	2.371	600	1.752
22	2.349	625	1.750
23	2.328	650	1.748
24	2.309	675	1.746
25	2.292	700	1.744
30	2.220	725	1.742
35	2.167	750	1.740
40	2.125	775	1.739
45	2.092	800	1.737
50	2.065	825	1.736
55	2.036	850	1.734
60	2.017	875	1.733
65	2.000	900	1.732
70	1.986	925	1.731
75	1.972	950	1.729
100	1.924	975	1.728
125	1.891	1000	1.727

Sources:

(a) For sample sizes ≤ 50: Lieberman, Gerald F., 1958. "Tables for One-sided Statistical Tolerance Limits." *Industrial Quality Control*, Vol. XIV, No. 10.

(b) For sample sizes > 50: K values were calculated from large sample approximation.

Upper Tolerance Limit versus Sample Measurements



Sample Data Set (n = 22)

Sample No.	Result	Sample No.	Result	Sample No.	Result	Sample No.	Result
1	13.8	7	13.1	13	15.0	19	12.3
2	13.4	8	14.6	14	12.4	20	12.0
3	12.0	9	13.3	15	13.5	21	15.6
4	12.9	10	12.5	16	14.8	22	14.1
5	15.2	11	10.4	17	15.5		
6	14.2	12	14.1	18	13.2		

Attachment #2 - Memo: Avalanche Mitigation for Phase II – Palmer Project

Memo

Date:	June 27, 2019
Project:	Constantine Mining, LLC. Palmer Exploration Project
To:	Kyle Moselle, Office of Project Management and Permitting
From:	Darwin Green, Constantine Mining LLC.
Subject:	**Avalanche Mitigation for Phase II – Palmer Project**

Background

Constantine submitted an application for a Waste Management Permit to ADEC on March 28th 2019, and Phase II Plan of Operations, including Reclamation Plan and Cost Estimate to the ADNR on April 11th 2019. These documents were submitted in support of Constantine's plan to conduct underground exploration in Glacier Creek Valley.

ADEC and ADNR have requested more information regarding avalanche risk and mitigation, in relation to the proposed surface infrastructure in Glacier Creek Valley. This memo addresses that request.

Glacier Creek Valley is subject to snow avalanches between October and June with the most active periods between November and April, owing to high snowfall and steep terrain (see Figure 1 for avalanche basin names and proposed infrastructure). Constantine has been studying the local avalanche cycles since 2010 in order to understand and mitigate avalanche risk. The results of that monitoring program suggest that the Glacier Creek access road to the portal site is subject to periodic avalanches that could restrict access both during periods of high avalanche danger and during snow clearing operations after avalanches. The monitoring program has also informed design of the current road alignment, proposed infrastructure, and structural avalanche defenses. Constantine has engaged industry experts to develop and implement an Operational Avalanche Safety Plan, which will include site-specific weather and avalanche forecasting, road closures and artificial triggering and cleanup. Consultants involved in various aspects of data collection, design, engineering and planning include Wilbur Engineering, Alaska Avalanche Specialists, Alaska Avalanche Information Center, Adopt Mountain Safety Services, Neve Technical Data Services, and Klohn Crippen Berger.

Facilities have been deliberately sited and designed by experts to avoid impacts of regular avalanches. Further reduction of the natural risk will be achieved with secondary structures and active management designed to decrease avalanche flow, extent and energy of less regular larger avalanches.

The philosophy applied is first to understand, then to avoid by design, then to minimize and mitigate through passive and active management

Data and Modelling

Constantine initiated avalanche studies in Glacier Creek Valley in 2010. The monitoring program has evolved over the years, with input from third-party avalanche forecasting and mitigation experts. The resulting datasets contribute to the understanding of avalanche activity in the Project Area, including Glacier Creek Valley:

- Regional and site-specific meteorological data (precipitation, temperature, wind);
- Regional and site-specific snow pack data (depth and temperature profile);
- Site-specific topographical information (slope / aspect);
- Site-specific avalanche path mapping, including start zone, track and runout; and
- Site-specific avalanche monitoring. This involves regular aerial surveys (after each major storm cycle) with fixed wing aircraft to photograph and record activity, and post-survey digitization of the avalanche paths from the photos. This has been ongoing each year since the winter of 2015-2016.

Using the collected data, Wilbur Engineering Inc. (Durango, CO) has developed statistical runout models and avalanche dynamics computer models to predict the avalanche flow directions, velocities and flow thicknesses and depositional areas in 3-dimensional terrain for various frequencies and sequences of avalanches. The modelling has informed the placement of Project infrastructure and structural avalanche defenses. **In addition to placement of facilities in areas of lowest hazard, conservative decision-making applying road closures and artificial avalanche release can achieve risk reductions of 80 percent or more compared to unmitigated conditions**.

Avalanche Mitigation

Mitigation measures will reduce the risk of uncontrolled avalanches, in order to keep workers safe, preserve infrastructure, and maintain permit compliance. Protection from avalanches will be achieved by a combination of hazard avoidance, structural defenses, and operational controls. Investments in structural measures will achieve a reduction in avalanche risk, which will be further reduced by implementing a detailed Operational Avalanche Safety Plan. The objectives of avalanche mitigation are:

1. Protection of human health and safety
2. Protection of site infrastructure
3. Reduction in operational down-time

Structural defenses include avalanche deflection berms and retarding mounds, designed by Wilbur Engineering (Figure 3). An avalanche deflection berm will be placed above the access road switchbacks and sediment control ponds. This berm will be approximately 150 meters long and 10-12 meters high, built using excavated surface material from the ponds and other development, as well as development rock from underground. The berms primary purpose is to mitigate impacts of avalanche to the switchback road and pond area. Retarding mounds will be placed in the avalanche runout of Hangover Helper. The retarding mounds are designed primarily for operational efficiency to reduce the amount of avalanche debris that collects on the access road. The mounds are not required for protection of the LAD, which will be buried below the impacts of avalanche activity. Figure 3 illustrates typical geometry

for avalanche retarding mounds, which each have a volume of approximately 4,500 m^3. Smaller defense structures used on site include snowsheds, a roof or tunnel-like structure that provides a high level of protection from avalanches. Snowsheds will be constructed to protect the portal areas fuel tank, generator and compressor on the portal pad as well as over the portal itself.

The Operational Avalanche Safety Plan will detail control measures including artificial triggering and debris clean up, and safety measures such as road closures and evacuations of avalanche areas. The Plan will be designed and implemented by a team of qualified professional avalanche forecasters with experience in providing support to industrial projects in avalanche terrain. Constantine is currently working towards developing a Plan with avalanche consultants.

Artificial triggering of avalanches with explosives or remote avalanche control systems will shorten avalanche runout distances compared to natural avalanche releases but increase the total number and frequency of avalanches. Late season wet avalanche volumes might be decreased by mid-winter artificial triggering. Artificial release of avalanches will achieve significant hazard reductions but can result in deposits of debris that reduce the effectiveness of structural measures and natural terrain protection. Areas where deep avalanche deposits are expected have been modelled and will be monitored and cleared to maintain the functionality of structural defenses as per the Operational Avalanche Safety Plan.

Access Road

The access road crosses two large avalanche runout zones named Hangover Helper and Indy 5000 (Figure 1 and Figure 2). Current culverts for Hangover and Waterfall creeks have been designed with a low profile and uphill armoring to withstand avalanche activity, and no damage has occurred to these structures since they were built in 2017. Structural defenses are planned for both runout zones; avalanche retarding mounds are planned upgradient of the road as it passes through the Hangover Helper runout zone, and the deflection berm protects the switchbacks from Indy 5000. Avalanche risk will be further managed along the access road by a detailed Operational Avalanche Safety Plan that includes weather and avalanche forecasting, road closures, access restrictions and artificial triggering and cleanup. Helicopter access and over-the-snow vehicles will be available for emergencies and during extended road closures.

Portal Site

The portal location has been selected based on its relatively low exposure to snow avalanches compared to nearby locations. The selected portal site avoids the destructive dense flowing avalanches from the large paths of Indy 5000, Paddy's Pocket and the Jarvis Headwall (Figure 1). However, this site may be exposed to relatively low-pressure (lower hazard) impacts from the outer edge zones of Indy 5000 powder avalanches. Due to the potential for small (size D2) avalanches above the planned exploration portal and portal pad (Figure 2), the exploration portal location will be structurally protected by extending steel arches for 6m from the portal site to the pad (snowshed). The portal site and portal pad will also be subject to operational mitigation measures (to be defined by the Operational Avalanche Safety Plan).

Utilities

All LAD pipes, utility pipes, conduits, ventilation fans and ducts will be either inside the portal or buried to reduce avalanche exposure. Both the upper and lower diffusers, and the piping to and from the sediment pond, are buried and will not be exposed to avalanche activity. The groundwater monitoring wells are low-profile and protected from avalanche activity by upgradient retaining walls where it is required.

Sediment Control Ponds

The settling pond location has been selected based on its relatively low-exposure to avalanches while also maintaining required functionality (i.e. necessary surface area for settling and ability for passive gravity flow from the pond to the high-permeability LAD site; Figure 2). No sign of avalanche has been observed in the pond site area in the 4-years that regular aerial monitoring surveys have been completed; however, modelling indicates potential for larger, infrequent avalanches to reach the site if left unmitigated. The probability of avalanche impacts to the ponds will be reduced to about a 10 to 30-year period with a combination of artificial release and the steep-sided avalanche deflection berm, which will deflect the initial avalanche impact and reduce run-out distances. During above average snow years, snow and avalanche debris could be used to construct temporary deflection structures to further reduce the risk of avalanche impacts to the ponds.

Risk of avalanche reaching the ponds is not entirely mitigated by the berm but the likelihood of occurrence during the planned operation period, and the potential impacts to facilities should it occur, are both relatively low. Structural integrity of the pond's earthen berms is not at risk of failure, and potential for damage to the 60 mil liners is low. It is estimated that the 30-year (3-percent annual probability) avalanche has potential to displace as much as 10 percent of the pond volume.

A spillway is included in the design of the pond to account for potential overflow in the unlikely event pond inflow exceeds outflow to the LAD (caused for example by line blockage or inundation from the portal). The risk of uncontrolled release of pond water due to avalanche is considered comparable to these other sources of potential uncontrolled discharge.

Primary Fuel Storage and Powder Magazines

Powder magazines and a 10,000-gallon fuel tank have been located on the 'backside' of the sediment ponds in a location that is the furthest distance behind the deflection berm. The location was chosen due to lower hazard level. Final placement and design of the fuel tank facility will adopt the most stringent avalanche avoidance and mitigation and may include addition of a berm immediately adjacent to the tank.

Compressors and Fuel Storage

Compressors, generators and day-use fuel storage will be protected by a snowshed placed in a relatively low avalanche hazard location near to the portal (Figure 2).

Summary

Avalanches are common in mountainous areas. Similar mitigation measures are used for communities, road systems, mining operations, and other types of commercial and industrial facilities for the protection of people, property and environment. Constantine has engaged consultants with expertise in avalanche science to develop a project design that creates a safe working environment and is protective of the environment.

Facilities have been deliberately sited and designed by experts to avoid impacts of regular avalanches. Further reduction of the natural risk will be achieved with secondary structures and active management designed to decrease avalanche flow, extent and energy of less regular larger avalanches.

Constantine is working diligently to finalize the details of its Operational Safety Plan and will be implementing the combination of structural and operational measures. Full implementation of these mitigation measures may cause periodic project interruptions but are not anticipated have a significant impact on the company's ability to meet permit stipulations.

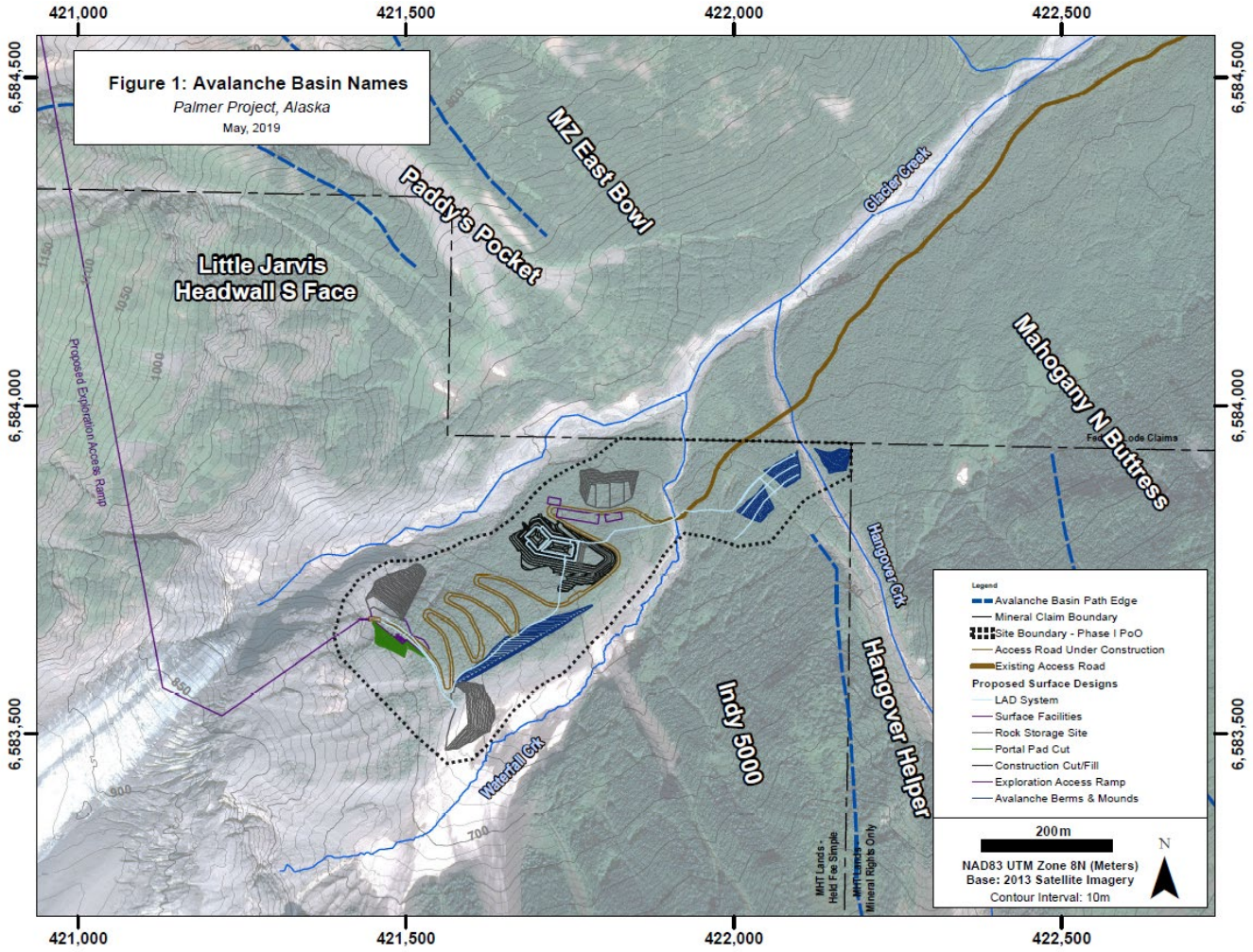


Figure 1 Avalanche Basin Names

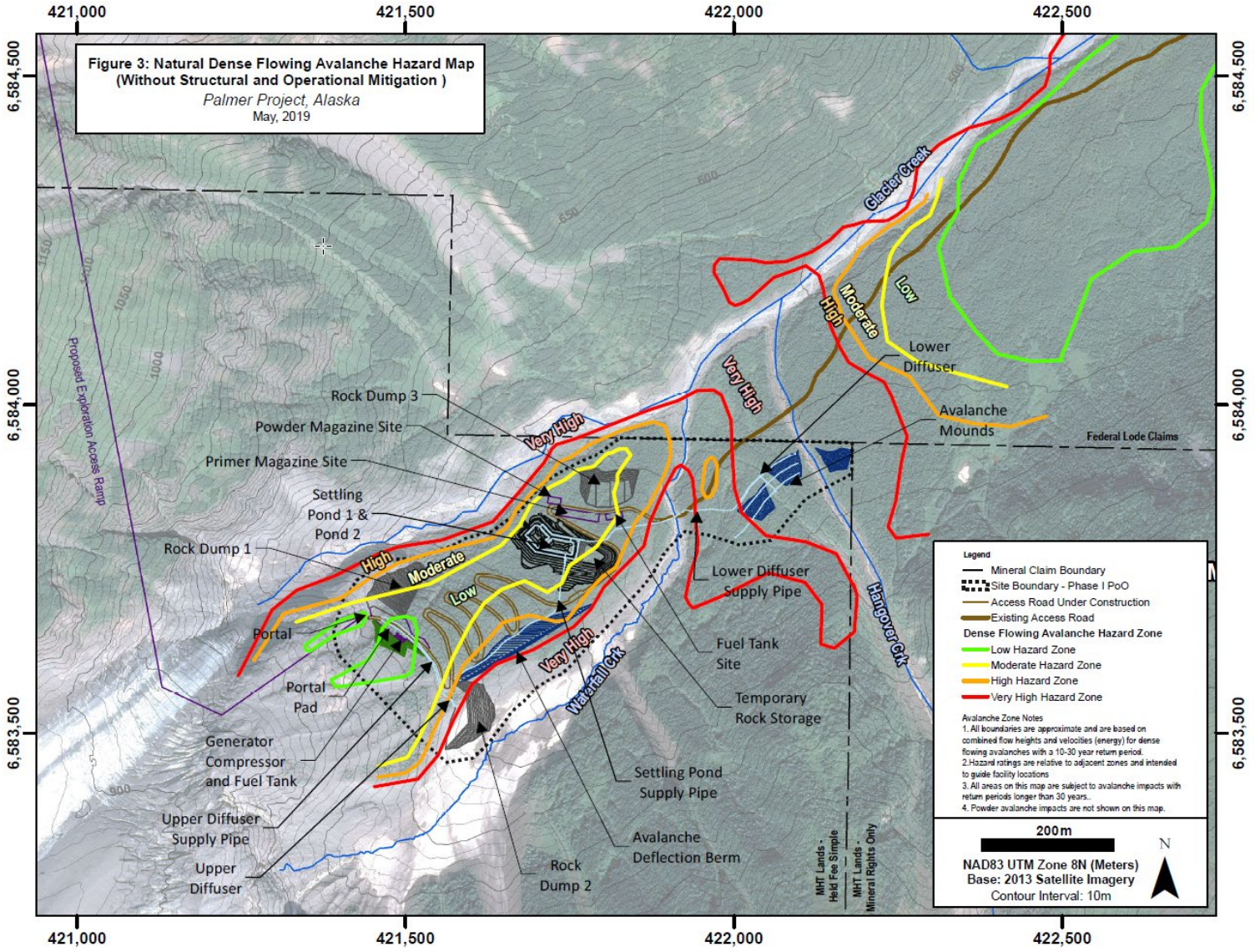


Figure 2 Natural dense-flowing avalanche hazard zones without structural and operational mitigation.

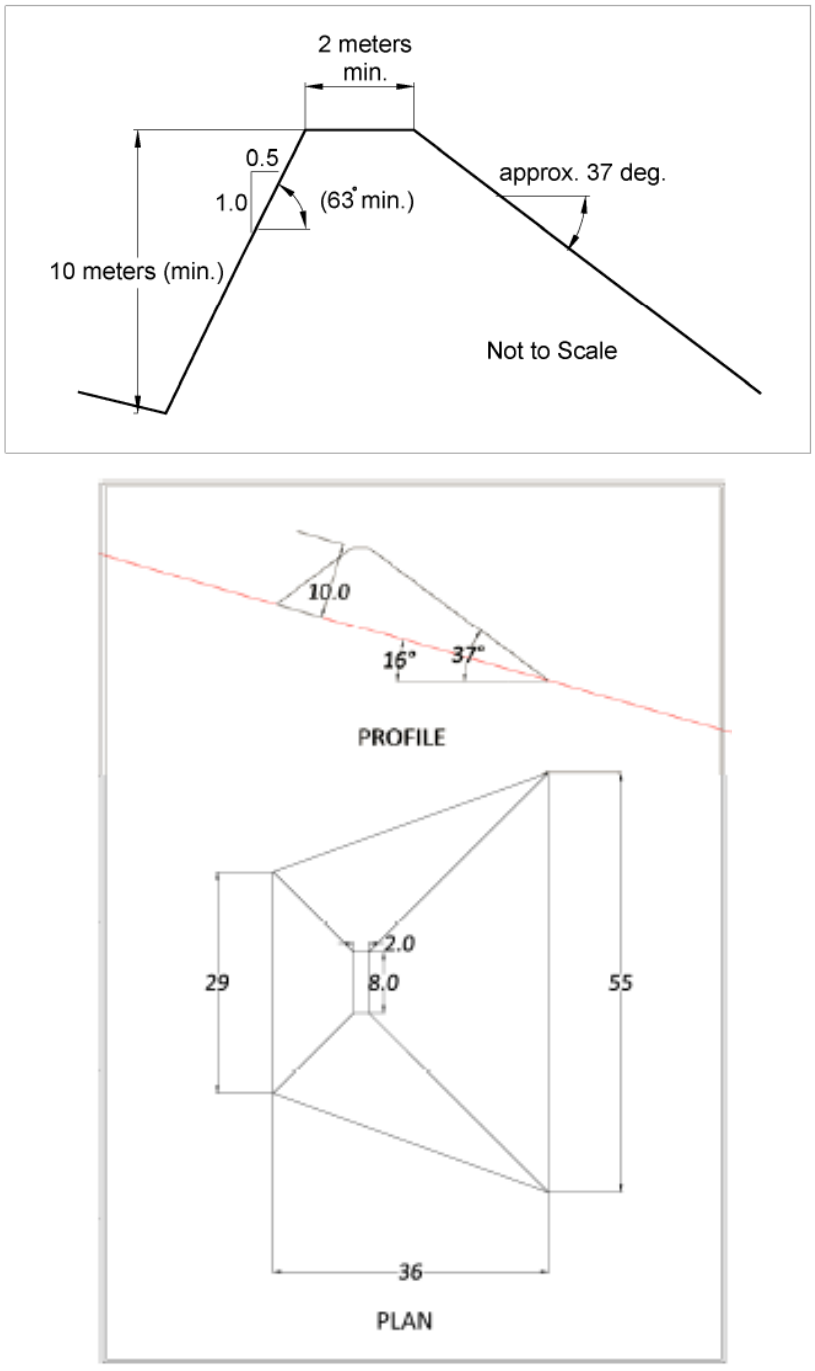


Figure 3 Approximate geometry of Avalanche Deflection Berm (above) and Retarding Mounds (below) by Wilbur Engineering. The left-hand side of each diagram is uphill.