

Peak Gold, LLC Responses to US EPA Region 10 August 19, 2022, Comment Letter to USACE Public Notice POA-2013-00286

EPA Synthesis of Key Findings from Review of Additional Documents Regarding the Proposed Manh Choh Mine

EPA Key Finding I: Water Resources Impacts

The Clean Water Act Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material are the substantive environmental criteria used to evaluate proposed discharges of dredged or fill material. The Guidelines require the Corps to make written factual determinations of the potential short-term or long-term effects of a proposed discharge on the physical, chemical, and biological components of the aquatic environment and “such factual determinations shall be used in § 230.12 in making findings of compliance or non-compliance with the restrictions in § 230.10.”

Based on EPA’s review of several materials received from the applicant, specifically the Peak Gold Response, Hydrogeological Report, Water Management Plan, Waste Rock Management Plan, and the Reclamation and Closure Report, we remain concerned that Manh Choh Mine Project as proposed has the potential to adversely impact additional waters of the United States (WOTUS) down gradient of the mine site over time. More specifically, EPA is concerned that perennial streams in the project vicinity would be subject to increased transport of dissolved arsenic during and after mining activities due to the proposed plans for water and waste rock management. Allowing for the discharge of polluted, contact water to groundwater has the potential to cause or contribute to water quality exceedances in down gradient WOTUS that already have recorded water quality exceedances on multiple occasions.

According to the Hydrogeological Report, several creeks located down gradient from the mining activities are supported by groundwater flow discharging from the bedrock water table, such as Hillside Creek and Tors Creek. The baseline monitoring in these streams indicates that several water quality parameters exceed the state water quality standards on occasion. For example, Tors Creek, which drains east to Tetlin Lake, and Hillside Creek, which drains west to Tok River, have recorded levels of pH, alkalinity, arsenic, aluminum, lead, and manganese in exceedance of ADEC water quality standards due to existing interactions between groundwater, the ore body, and the discharge of that groundwater into these streams. The Guidelines at 230.10(b)(2) specify that no discharge of dredged or fill material shall be permitted if it causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable water quality standard, thus the proximity of these down gradient waters to the proposed mining infrastructure prompt the need for accurate baseline water quality characterization and monitoring over time.

Accurate baseline information is critical to understand how the project is impacting water quality over the long term. In our review of the available baseline information, we have identified some inconsistencies in the water sampling data from Tors Creek and Hillside Creek that was used in project planning phases. The supplied baseline surface water quality data includes data that is indicated by a table note to be erroneous due to instrument malfunction. Furthermore, at Hillside Creek on July 28, 2021 (i.e., which is not a date indicated in footnotes that contains erroneous results), a surface water sample was collected that resulted in a 11.9 mg/L dissolved iron content with a pH of 7.68. Given the fact that iron solubility in natural water is determined heavily by pH and that iron begins to precipitate

out of solution around neutral pH, this reading also appears to be erroneous and not an accurate reading of the baseline parameters. This reading and others call into question the quality assurance and quality control (QAQC) used in the existing water quality monitoring data. EPA encourages the continuation of water quality monitoring in Tors and Hillside Creeks prior to beginning mining activities with sufficient QAQC in an effort to accurately characterize baseline water quality conditions. EPA supports the monitoring proposed by the applicant and recommends that this water quality monitoring should continue during operations and after mining has ended.

EPA has concerns about the level of uncertainty associated with the hydrologic modelling provided by the applicant and the disclosed potential for metal and arsenic pollution from the project. Specifically, EPA is concerned assumptions used in the modeling may have led to modeling results that underestimate the potential for groundwater contamination. For example, the assumption that all precipitation would runoff surficially and not infiltrate the waste rock piles during operations appears unfounded given the annual precipitations rates and patterns, that waste rock areas will not be covered, and that broken waste rock is highly permeable, even if the crystalline rocks themselves are not. Even if precipitation infiltration of the proposed waste rock piles is minimal during operations, portions of the waste rock backfilled into the pits will be in contact with groundwater.

Additionally, the arsenic adsorption model prepared for this project may not accurately represent the geologic setting of the mine site. The arsenic adsorption model described in the Hydrogeological Report uses a sorption coefficient for a soil/water partition and is not applicable to groundwater movement through bedrock.^{17,18} While we acknowledge that the modelers attempted to account for this point by scaling for surface area in fractured limestone, this model is objectionable for evaluating the attenuation of arsenic in bedrock that is primarily quartz muscovite schist. As such, EPA does not have confidence that the provided arsenic transport model results accurately represent the likelihood for groundwater contamination by arsenic from waste rock from the proposed mining activities.

Compliance with the Guidelines at 230.10(d) requires projects to incorporate appropriate and practicable steps to minimize impacts to the aquatic ecosystem. In accordance with 230.10(d), EPA believes additional practicable mitigation measures should be applied to the project to minimize the potential degradation of water quality from secondary impacts of the project. Specifically, we are providing recommendations on measures for site preparation and reclamation work to ensure secondary impacts are minimized to down gradient WOTUS.

The project includes subaqueous disposal of PAG waste rock within the South Pit. According to the Reclamation and Closure Report, after reclamation, the South Pit is proposed to be left as a depression that can collect more water than under current, natural conditions. EPA recommends the South Pit be fully backfilled, mounded and capped as proposed for the North Pit. Fully backfilling the South Pit will restore the original site contours to the maximum extent practicable and will minimize the size and footprint of the post-closure Main Waste Rock Dump. It will also more fully encapsulate the PAG waste rock and provide greater protection from environmental weathering. Reducing the infiltration of water into the pit will also minimize the potential for the project to increase the seasonal groundwater fluctuations beyond the natural conditions.

EPA is concerned about infiltration through waste rock in the waste rock dumps both during and after mine closure. EPA believes it is practicable to reduce the potential for water to infiltrate beneath the proposed waste rock dumps by establishing low-permeability foundations of compacted fine-grained

materials during site preparation. The foundations should be established after clearing, removing overburden/organics, and leveling the waste rock dump sites. The foundations should be graded or crowned to direct site precipitation laterally to the perimeter ditches. The post-closure Main Waste Rock Dump should also be contoured and capped to promote runoff and minimize infiltration into the waste rock as proposed for the North Pit.

The proposed management of contact water also presents opportunities for infiltration or the spread of contaminants. EPA recommends that opportunities for contact water in the perimeter ditches to pond and infiltrate should be minimized by maintaining consistent flow lines and gradient within the ditches. The applicant should avoid excavating or establishing the proposed holding ponds within jurisdictional waters, including wetlands. Contact water and treated effluent should not be used for dust control unless sampling indicates it would not alter the chemistry of potential receiving waters (e.g., wetlands adjacent to mine facilities or the road that could receive runoff or fugitive dust). Brine from the water treatment plant and filter wash water should generally not be used for dust suppression, as it can elevate the concentration of metal salts in adjacent surface waters. Brine from the water treatment plant and filter wash water could potentially be used for dust suppression or material compaction at the waste rock dumps. Obviously, point source discharges into jurisdictional waters would require APDES authorization pursuant to CWA Section 402.

Even with these additional minimization measures, there is still some potential for adverse impacts to down gradient WOTUS from pit seepage and groundwater altered by contact with PAG waste rock. EPA recommends that the Corps require as a condition of the permit that the applicant develop an adaptive management plan that identifies how seepage from the pits will be collected for treatment if the groundwater or surface water monitoring indicates that groundwater chemistry has been altered by the contact water. A specific concern is that contact water from the South Pit will move down gradient and emerge in the drainages flowing to Hillside Creek. There appears to be less risk that the chemistry of groundwater within the North Pit will be altered by contact water and that seepage will impact Tors Creek; however, the adaptive management plan should address the potential need to capture seepage from both pits.

Peak Gold, LLC (Peak Gold) Response to Water Resources Impacts Page 1, Paragraph 1.

The mean concentration of arsenic in groundwater from baseline water quality sampling is 0.008 mg/L compared to 0.012 mg/L and 0.0025 mg/L in natural surface water in Tors Creek and Hillside Creek, respectively. After accounting for inputs from contact water from the source terms, mixing with native groundwater and attenuation processes in the numerical model, the average predicted groundwater discharge concentration is 0.008 mg/L, which is less than the ADEC limit of 0.01 mg/L.

Calculated arsenic concentrations in groundwater discharge do not increase constituent loading in Tors creek, which will remain constant through the year due to natural runoff water quality.

Calculated average arsenic concentrations in Hillside creek increase to 0.0026 mg/L. Calculated peak arsenic concentrations in Hillside creek increase to 0.008 mg/L during low-flow periods in late summer. Calculated total constituent loadings remain below regulation limits in Hillside Creek.

Peak Gold Response to Water Resources Impacts Page 1, Paragraph 4.

Formal quality control and quality assurance (QA/QC) procedures established in writing¹ for the project studies are consistent with industry best practices and are based on specific requirements laid out by ADEC² and the US EPA³. These will be made available with updated permit documents to provide assurance to the veracity and quality of the data incorporated in this study. Databases used for the study only include data that pass the QA/QC requirements of the project. We appreciate the EPA highlighting the note in the table. The sample in question was excluded from analyses. With respect to the iron concentration in surface water that was flagged in section I-A, page 2, paragraph 2, all water quality analyses of surface water are for total metals. Dissolved metals analyses were only conducted on filtered samples from groundwater wells.

Peak Gold Response to Water Resources Impacts Page 2, Paragraph 3.

A curve number of 75 was used for modelling runoff from waste rock piles and up to 87 for other surface areas at site, based on analogous USDA hydrologic soil types. Infiltration is implicit in this empirical method and is higher in the footprint of the waste rock compared to the remainder of site during operations. However, the surface of the waste rock would be expected to include a significant proportion of fine material as a result of the mining, transport and tipping process and due to compaction by haul trucks.

Based on the site-wide water balance and high porosity of the waste rock, waste rock piles are not expected to saturate and pore water will not reach bedrock within the timescale of mining. Recharge was not applied to the model until closure to approximate the delay between infiltration of water and discharge to underlying bedrock. Recharge was applied to the waste rock in closure simulations to assess the impacts of long-term flow-through and percolation of pore water downward into underlying bedrock.

Baseline surface and groundwater data presented in Figure 4.4 indicate that sorption of arsenic is a natural phenomenon in groundwater at site. It should be appreciated that, in the oxide and transition zone, the original rock mass is partly broken down, resulting in an abundance of sites potentially available for sorption, particularly within the mica-rich schistose rock mass. Analyses indicate that the coefficients used in the analysis are consistent with the constituent behavior observed at site. Reducing or removing arsenic attenuation in the model as part of our sensitivity analyses generated similar outcomes in constituent concentrations. Specifically, arsenic only exceeds water quality requirements due to arsenic naturally occurring in surface waters in Tors creek. Additional details of the sensitivity analyses will be provided in the updated hydrogeology report.

¹ Piteau Associates Engineering Ltd., 2019. Groundwater and Surface Water Sampling Analysis Plan. Draft Report prepared for Peak Gold LLC, 4148-R01, September 2019

² ADEC 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances, December 2013

³ U.S. EPA 2014, Sampling and Analysis Plan Guidance and Template. Version 4, General Projects. R9QA/009.1, May 2014

Peak Gold Response to Water Resources Impacts Page 3, Paragraph 2.

Internal tradeoff analysis of backfill alternatives for South Pit considered cases including:

- *No backfill*
- *Partial backfill with exposed pit highwalls*
- *Partial backfill with covered pit highwalls*
- *Full backfill recovering the original topographic profile*

The conclusion of these assessments was that PAG backfill placed in the bottom of South Pit is better encapsulated by keeping it submerged under saturated groundwater conditions by partially backfilling the pit. Containing pit wall runoff and recharge within the pit footprint ensures the PAG backfill remains submerged. In contrast, by fully backfilling the pit, the water balance is reduced by increased runoff and the PAG will not saturate.

Peak Gold Response to Water Resources Impacts Page 3, Paragraph 3.

We appreciate the EPA's recommendation on improvements to the waste rock design and will review it with the design team. However, foundation liners to further reduce percolation of groundwater were not recommended due to:

- a. Compacted fine-grained materials are inherently weak and pose significant geotechnical risks for foundation stability on inclined slopes*
- b. The relative permeability of unsaturated waste rock would already be quite low and fine-grained liners would provide limited additional benefit*
- c. Perimeter ditches will be reclaimed during closure to avoid contact water being exposed at surface*

Allowing infiltrated water to percolate vertically downward naturally mitigates contact water by attenuation processes in the vadose zone and mixing with the regional bedrock groundwater system as described in the hydrogeology report.

Peak Gold Response to Water Resources Impacts Page 3, Paragraph 4.

Perimeter ditches described in the water management plan are designed with a constant grade to conduct water to collection points below the two open pits. Detailed soil mapping of soils at site indicates the ditches will be excavated in poorly graded silt-rich soils which will inhibit infiltration.

The follow measures were incorporated in the proposed water management plan to avoid holding ponds in jurisdictional waters to the extent possible:

- a. The disturbance area of holding ponds has been minimized by construction of linear ponds;*
- b. Potential for seepage will be mitigated by installing liners for ponds residing in or near wetlands; and*
- c. Liners will be used where ditching crosses local wetlands.*

Any waters that are to be applied to roads will be tested for compliance with limits established under the terms of issued permits, as mentioned in Section 3.1 of the water management plan. On receipt of permits,

the water management plan will be updated to include the explicit monitoring requirements of those permits.

The water management plan will be updated to include details of monitoring and mitigation measures to identify and address any deviation from the predicted behavior of constituents that may migrate down gradient towards WOTUS during operations and closure.

Water management will also include storm water control during mine construction activities in accordance with the Alaska Pollutant Discharge Elimination System, General Permit for Discharges from Large and Small Construction Activities, Permit Number AKR100000. The construction general permit became effective January 1, 2021 and expires January 31, 2026.

Storm water control during mining and reclamation activities will be in accordance with Alaska Pollutant Discharge Elimination System, Multi-Sector General Permit for Storm water Discharges Associated with Industrial Activity (MSGP), Permit Number AKR060000. The MSGP became effective April 1, 2020 and expires March 31, 2025.

EPA Key Finding II: Air Quality Impacts

In an effort to use existing ore processing infrastructure, the applicant proposes to transport extracted materials from the Manh Choh mine to the Fort Knox ore processing center using the Alaska highway system and other public roads. As EPA indicated in our February 11, 2022 comment letter, the PN did not mention the planned haul route or provide details for the transportation of ore being hauled to Fort Knox for processing. According to subsequent information received from the applicant, the general route the extracted materials would take via truck would travel via constructed gravels roads to Tetlin Village Road, then on Alaska Highway 2 to Delta Junction, where the trucks would likely take Richardson Highway to Fairbanks, and pass through Fox, AK to the Fort Knox Facility on Steese Highway. The route is approximately 250 miles long each way, and the proposed route would experience an increase in the annual average daily traffic (AADT) of 192 vehicles along this route.

Based on this new information, the proposed haul route would seemingly direct trucks through an airshed that has been formally designated by EPA as “Serious” Nonattainment for exceedances of the National Ambient Air Quality Standards (NAAQS). A portion of the Fairbanks North Star Borough, including the City of Fairbanks and the City of North Pole, was designated as a Nonattainment Area for Particulate Matter (PM_{2.5}) in December 2009 because these areas exceed the health based 24-hour PM_{2.5} NAAQS of 35 micrograms/cubic meter. According to Alaska Department of Environmental Conservation (ADEC), particulate pollution in this area is the result of local emissions from emissions from wood stoves, burning distillate oil, and industrial sources, as well as motor vehicles and trucks.

PM_{2.5} is primarily a concern during the winter months (October through March) when extremely strong temperature inversions are frequent and human-caused air pollution impacts increase.

Emissions that originate from gasoline and diesel engines, primarily motor vehicles, contribute to these PM_{2.5} concentrations. The drastic increase in AADT resulting from this project is likely to have an adverse effect on the air quality in the nonattainment area.

EPA recommends that the Corps consider and disclose the air quality impacts that would result from the proposed use of heavy duty vehicles in the Fairbanks PM_{2.5} Nonattainment Area, particularly the effect on emission budgets for transportation planning and conformity purposes.

To help reduce the PM_{2.5} emissions from the heavy-duty trucks carrying ore through Fairbanks from the Manh Choh Mine to the Fort Knox ore processing facility, EPA suggests the applicant consider and identify mitigation measures. Implementing measures that ensure efficient vehicle performance and best practices for heavy-duty hauling will minimize air quality impacts. Examples include:

- 1) Only use heavy duty trucks with Tier 3 engines, preferably 2010 or newer. In addition to the Tier 3 engines, we recommend that the project verify that the engines in these trucks have fully functional emission reduction systems.
- 2) Ensure all trucks have a tarp deployed over the bed to “cover the load” and minimize material from blowing out the back of the truck.
- 3) The project could supply the municipalities in the nonattainment area with a street sweeper capable of removing PM_{2.5} and smaller, and the municipalities would then operate this sweeper on the truck route to remove road dust, which decreases particulates raised by

these trucks.

Further, EPA understands the applicant has proposed to cover the beds of trucks that will be transporting ore via Alaska public highways, and it is not clear whether all roads used to haul ore are considered Alaska public highways and would be subject to this measure. EPA recommends applying this mitigating measure to the entire haul route as feasible.

While covering the truck beds will help reduce the amount of particulate matter generated by this proposed activity, particulate matter is also generated from the emissions of the truck engines, wearing of tires and brake pads, and traffic congestion. Thus EPA expects particulate matter would still increase in the Fairbanks PM_{2.5} nonattainment area as a result of the sheer volume of additional heavy duty trucks proposed to be operating to haul ore from the Manh Choh Mine to the ore processing facility in Fort Knox, as well as the potential for increased traffic congestion and subsequent vehicular emissions. Such impacts to air quality have the potential in the near term²⁴ to impact the Fairbanks North Star Borough's ability to build future transportation infrastructure projects if the area is not able to meet the State Implementation Plan developed by ADEC and approved by EPA. Over the long term, these truck emissions could impact the area's ability to meet the 24-hour PM_{2.5} NAAQS of 35 micrograms/cubic meter in a timely manner. EPA recommends that at a minimum, the Corps evaluate and disclose the potential impacts to air quality in the NEPA analysis for this project.

Peak Gold Response to Air Quality Impacts

Peak Gold trucking will have insignificant contribution to overall emissions in the Fairbanks/North Pole PM_{2.5} Serious NAA.

The PM_{2.5} NAA issue in Fairbanks/North Pole is based on difficulties meeting the 24-hour PM_{2.5} national ambient air quality standard (NAAQS) in the winter. As such, Fairbanks SIP planners focus on modeling wintertime 24-hour episodic emissions of PM_{2.5} and precursors to develop a plan for coming back into attainment of the 24-hour PM_{2.5} NAAQS. Peak Gold calculated its maximum 24-hour emissions to compare to the currently available emissions budgets for SIP planning purposes. As the table below shows, the Manh Choh trucking emissions in the NAA would increase the total NAA SIP emissions budget for PM_{2.5} and each precursor by much less than half of one percent. Compared to mobile source emissions only, Manh Choh would increase the emissions budget by less than one percent for each pollutant. Modelling is based on the assumption of 80 round trips per day. Actual trips may be less.

Pollutant	Manh Choh Max 24-Hour Trucking Emissions in NAA	Alaska SIP Emission Budget in NAA – All Sources	Manh Choh Percentage	Alaska SIP Emission Budget in NAA – Mobile Only	Manh Choh Percentage
PM _{2.5}	0.0039 tpd	1.9900 tpd	0.20%	0.4000 tpd	0.97%
NO _x	0.0084 tpd	16.2400 tpd	0.05%	2.2700 tpd	0.37%
SO ₂	0.0001 tpd	10.7100 tpd	0.00%	5.6000 tpd	0.00%
VOCs	0.0043 tpd	18.0600 tpd	0.02%	7.1900 tpd	0.06%
Ammonia	trace	0.3060 tpd	0.00%	0.0450 tpd	0.00%

The Manh Choh ore transport plan includes steps to minimize air quality impacts.

- Peak Gold will purchase new trucks with Tier 4 engines. Using Tier 4 engines is a 90% reduction in PM_{2.5} emissions compared to Tier 3 engines.
- Loads will be covered to minimize dust. These covers will be in place for the entire trip.
- >10% fewer trips will be required after improving payload through detailed equipment design
- Trucks will use ultra-low sulfur diesel (ULSD) fuel.

Emissions from Manh Choh trucking are so small that federal approvals required for Manh Choh are exempt from General Conformity.

The proposed route through the Fairbanks/North Pole NAA is about 32.5 miles each-way by a route recommended by the Alaska Department of Transportation (ADOT) as the best commercial trucking route through Fairbanks. Using the latest trucking assumptions above and the ADOT route, the table below provides Peak Gold's estimates of direct and indirect emissions of PM_{2.5} and precursors from ore trucks within the boundaries of the Fairbanks/North Pole Serious NAA.

These estimates are compared to the General Conformity de minimis values found in 40 CFR 93.153(b)(1). EPA designed the de minimis values for actions (in this case, Manh Choh trucking through the NAA) that are so small they are exempt from further analysis to demonstrate they will not interfere with the Alaska State Implementation Plan (SIP). As shown in the table below, Corps of Engineers and EPA obligations under General Conformity for Manh Choh are met simply by the insignificant contribution of emissions within the NAA.

Pollutant	Manh Choh Max Annual Trucking Emissions in Fairbanks/North Pole NAA				General Conformity De Minimis	Exempt from General Conformity?
	Tailpipe	Paved Road Particulate Suspension	Brake and Tire Wear	Total		
PM _{2.5}	0.14 tpy	1.20 tpy	0.07 tpy	1.42 tpy	70 tpy	Yes
NO _x	3.06 tpy			3.06 tpy	70 tpy	Yes
SO ₂	0.05 tpy			0.05 tpy	70 tpy	Yes
VOCs	1.56 tpy			1.56 tpy	70 tpy	Yes
Ammonia	trace			trace	70 tpy	Yes

Peak Gold is already in communication with Fairbanks/North Pole PM_{2.5} Serious NAA planners regarding Manh Choh trucking. The proper mechanism to review Manh Choh NAA impacts is through the transportation planning and SIP review processes, which are already underway.

A team of air quality planners from the Alaska Department of Environmental Conservation (ADEC), the Fairbanks North Star Borough, Fairbanks Area Surface Transportation (FAST) Planning, and various supporting consultants are tasked with developing and implementing the Alaska SIP plan for bringing the NAA into attainment. These planners are aware of the trucking operation and have made public statements that they intend to include Manh Choh trucking in their 20-year growth projections that will model all Fairbanks traffic AADT projections, congestion expectations, stop light sequencing, and other

mobile source parameters for Fairbanks transportation conformity purposes. Thus, we expect the next version of the SIP emissions budget to fully consider Manh Choh. Transportation planners have stated that mobile source modeling results should be ready by the end of 2022. EPA and the public will have ample opportunity to review and comment on results through the transportation planning and SIP review processes.

The ADOT has initiated its own review of the transportation corridor from Tetlin to Fort Knox.

There is yet another opportunity for detailed review of trucking between Manh Choh and Fort Knox. The ADOT has a solicitation out for a contractor to prepare an Alaska/Richardson/Steese Highway Corridor Action Plan. See ADOT RFP No. 25-23-1-012. This project is intended to be a comprehensive review of all corridor traffic issues including capacity, congestion, and air quality. An important result of this study will be recommendations for, among other things, short-term and long-term freight routes. This process should be allowed to run its course. If a better alternative for transportation through the Fairbanks/North Pole NAA is recommended, Peak Gold would be receptive to the results.

A street sweeper specifically for Manh Choh PM_{2.5} road dust would be ineffective and unnecessary.

As set forth above, Manh Choh is at most only 1-2% of traffic along the route through the NAA. Manh Choh trucking emissions would be much less than 1% of total emissions in the NAA. Furthermore, PM_{2.5} nonattainment occurs in the wintertime when street sweeping is not feasible in Fairbanks.