

**MICHAEL SPINDLER**

Thank you for the opportunity to comment. Please see the uploaded file.

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#### Manh Choh Comments

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Ashlee:

I reviewed most of the Manh Choh documents posted on your DNR large mines website, and from related sources. While I am not an expert in geochemistry, nor mining engineering, I have a strong science background, and I have experience working in the Tetlin-Northway area. After a few weeks reviewing most of the documents your website, I have many comments. I will start with some general comments, followed by specific page-referenced comments on the various documents.

I appreciate the thoroughness displayed by Kinross-Peak Gold, and contractors SRK Consulting (geochemical analysis and mine reclamation planning) Piteau Associates (water hydrogeological research/modeling, water quality/management plan), and ABR (fish birds, mammals). I was impressed with the scientific rigor and attention to detail in the documents that is necessary for a project of this scale. And I surmise that these consulting companies did their own internal peer reviews that allow their results and recommendations to stand on past performance and corporate reputations. But I noted legal disclaimers that should be a caution to all: page 270 in the *Water Management Plan* concluded with “This investigation has been conducted using a standard of care consistent with that expected of scientific and engineering professionals. No warranty is expressed or implied.” And the *Waste Rock Management Plan* began with a disclaimer: “SRK Consulting (U.S.), Inc. (SRK) has prepared this document for Peak Gold LLC (PGL), our client. Any use or decisions by which a third party makes of this document are the responsibility of such third parties. In no circumstance does SRK accept any consequential liability arising from commercial decisions or actions resulting from the use of this report by a third party” (page 279). Why? Are the risks too great? Will DNR and DEC assume these risks? More importantly, are the citizens of Alaska expected to assume these risks?

#### A NEED FOR INDEPENDENT PEER REVIEW

As a long-time career scientist, I know the value of independent peer review. I believe DNR and DEC must conduct an independent peer review of four highly technical documents: (1) *Geochemical Characterization report*; (2) *Reclamation and Closure Plan*; (3) *Hydrogeological Characterization and Water Management, Monitoring Plan, Waste Rock Management Plan*; and (4) *Support Document for Waste Management Permit and Plan of Operation*. As you well know an error to the conclusions derived from this work could lead to serious environmental impacts. And, the costs to mitigate those consequences could greatly exceed the cost of the proposed Financial Assurance bond. Before DNR and DEC issue any permits an independent and neutral organization with such expertise (e.g. University of Alaska) should be engaged in this important part of your permitting process. That would inspire public confidence in your permitting decisions.

## POTENTIALLY ACID GENERATING WASTE TO BE TRANSPORTED FROM TETLIN FOR FORT KNOX

One of the most significant issues for this entire project is that Potentially Acid Generating (PAG) and heavy metal leaching (ML) wastes will be produced locally at the Manh Choh mine site AND also TRANSPORTED OUT OF THE AREA to the Fort Knox Mine for processing. Page 10 in the *Manh Choh Project Reclamation and Closure Plan- Revision 1* states “Ore mined from the Project will be trucked to Fort Knox for processing, further reducing the environmental footprint at the Project location by eliminating milling, tailings management and storage.” While this proposed action may reduce some footprint-type impacts at Manh Choh, it creates other perhaps more serious problems because it introduces the possibility that PAG and ML pollution could occur to the Fort Knox environs. PAG and ML tailings were not approved or anticipated when that project’s environmental review occurred. Yet, page 1 on the *Alaska Department of Environmental Conservation Water Quality Certification* for Manh Choh (signed by Program Manager, James Rypkema August 29, 2022) includes the statement “Ore processing and gold recovery will use existing, permitted facilities at Fort Knox. No milling of ore will be completed at the [Manh Choh] Project. Therefore, no tailings disposal will take place at the Project. Tailings disposal will take place at the permitted Fort Knox Mine. *The Project does not require any new federal permits at Fort Knox*” [italics added].

While the State of Alaska may interpret that no new federal permits are required, I ask what due diligence has been performed by Kinross-Peak Gold, DNR and DEC to analyze the potential impacts of PAG and ML tailings in the Fort Knox area? How has the possibility of PAG and ML tailings entering the Chena River watershed been investigated? How have the impacts of potential PAG and ML pollution on fisheries and aquatic life in the Chena River watershed been evaluated? The 1993 Environmental Assessment for Fort Knox must be updated, and a new public process undertaken, before this proposed action is approved by DNR and DEC. Likewise, the Fort Knox Reclamation and Closure Plan also must be revised because of the potential for PAG and ML pollution. I have not found any documentation on the DNR Manh Choh permitting website, nor the DNR Fort Knox website to indicate that this work is planned or in progress.

## PAGE-SPECIFIC COMMENTS

### RECLAMATION AND CLOSURE PLAN

Page 41 states: “The South Pit highwall will remain exposed after reclamation...The highwall may gradually unravel due to freeze/thaw activity, but the slopes are designed to be stable during operations and post-mining periods.” Figure 9 on Page 42 shows a significant vertical elevation of highwall and terraces remaining post-closure. Why can’t the pit be re-filled to ground level? If it is not filled to ground level the terraces should be removed and the ground sloped naturally and revegetated. This was done by Kinross in reclamation of their True North prospect. Leaving the highwall and terraces allows more opportunity for pollution and erosion, plus, it could cause mortality to big game mammals such as caribou and moose. Furthermore, several hundred linear feet of vertical terrace cliffs pose an undue hazard to moose that may be attracted to preferred browse species such as willow, aspen, or poplar that will eventually, and hopefully, revegetate the terraces. This aspect needs major revision.

Page 44. How long is the impervious liner expected to remain impervious? 50 years? 100 years? The document should include an estimate of its life expectancy based on observations and experience at other mines. If it does not remain impervious after 100 years what are the consequences?

Page 45. It would be good to explain again why the South Pit will not have an impervious liner. I understand it is because Kinross-Peak Gold states “Storing PAG waste in a low oxygen environment (underwater) will reduce ARD generation potential.” And I understand that rainwater infiltration will help maintain the desired water level. But this raises other questions.

I must ask if Kinross-Peak Gold, DNR, and DEC are confident that the PAG and ML waste types can be segregated so thoroughly that there *is zero chance* that any ML waste, which should stay dry, ends up being submerged in the South Pit? Or *vice-versa*? The strategy for waste segregation should be explained here in a general way, and the reader should be referred to the more detailed information provided elsewhere in the documents (e.g. pages 292-304 in the *Waste Rock Management Plan*). Page 304 states: “An electronic map would be developed by the short range planner to differentiate between the ore and waste types. This electronic map would be available to the shovel operator in real time via an on-board computer screen so the type of material loaded into the truck would be known at all times. When equipment is loading from a particular area, a code would be assigned to the truck being loaded and the designation would appear on the operator’s screen. The system would record the volume of each waste rock type mined during each shift and its ultimate destination. This mining methodology would ensure that ore and waste rock types are mined and delivered to the correct location.” Page 304 also states “The specifics of the blending approach *are being developed* to ensure that neither acid generation nor accelerated metal leaching occur beyond the grain scale” (italics added). This suggests PAG and ML contamination avoidance strategies are still being developed. Is there any literature available within the mining industry which indicates this strategy is 100% successful? And if there are reports of errors or failure points what strategies would be used to prevent cross-contamination of waste and tailings types? Once cross-contamination is discovered what mitigation strategy is planned?

Page 49. Highway Haul maintenance thaw shed. It is not explicitly stated here that the highway trucks will be washed year-round to control fugitive dust or spread of invasive species. Page 8 in the *Support Document of the Waste Mgmt Permit* indicates trucks will be washed, but it is not explicit as to whether it will be done all winter long. It should be. There is documentation from the Dalton Highway that seeds of White-sweet Clover (*Melilotus alba*, a highly invasive plant) are spread in winter through snow plowing, truck tire treads, and snowmobiles. And winter spread of fugitive dust on the undersides of vehicles, even if the top is covered, is also a known concern.

Page 55. Kinross-Peak Gold states: “...capacity to store both the ML and PAG stockpiles exist in either the North or South pits at any point in the mine life sequence. No additional changes to the reclamation plan are required for closing the mine in a premature closure scenario, nor will the planned configuration change.” I am glad that Kinross-Peak Gold considered the contingency of a premature closure. But I am greatly concerned that they did not consider an alternative and opposite scenario in which most, or all of the ore processing occurs at Manh Choh, with no highway haulage to Fort Knox. Surely Kinross-Peak Gold is aware that the former partners of the prospect, Royal Gold, in 2018 analyzed and decided to do local processing of the ore. And surely Peak Gold is aware of the controversy surrounding their Highway Ore Hauling Plan. To instill public confidence the proponents must consider another alternative, that of local ore processing. They must analyze and present to the public the pro’s and con’s of both local and distant ore processing. The DNR must require Kinross-Peak Gold to analyze pit capacity and strategies for disposal of waste rock and tailings at Manh Choh if ore is processed locally, instead of transported away.

Page 59: In multiple places place estimation of costs for calculation of Financial Assurance provide this qualifier: “cashflows for post closure years are undiscounted.” While inflation from 2020 to 2022 was considered, it was projected no further into the future than 2022. Wouldn't most economists recommend that an inflation rate be planned for all future years, to ensure the Financial Assurance will be adequate in all those years?

#### SUPPORT DOCUMENT FOR THE WASTE MGMT PERMIT AND PLAN OF OPERATIONS Rev-1

Page 8 states “...the tire cleaning system will minimize the potential to import and/or spread propagules of invasive plant species in the Project area from offsite vehicles entering the Project area...” This a really good feature of the permit and I encourage its implementation, even in winter. Again, as mentioned above, there is documentation that invasive plant seeds can easily be dispersed in winter, so year-round washing is highly recommended.

#### MONITORING PLAN

Table 5-4 on Page 17 in the *Monitoring Plan* introduction indicates a 5+ year post closure monitoring of water quality. Page 42, Table 5.1 in the *Support document for the waste mgmt permit and Plan of Operations* shows a six-year period of post-closure monitoring. Page 68 in the *Reclamation Plan Basis of Estimate* states water “Monitoring locations, frequencies, and durations have been provided by Peak Gold. These include surface water and well sampling. Monitoring is expected to be conducted for 10 years post-mining, or 8 years post reclamation.” These are inconsistent; they do not address possible long-lasting effects post-closure, and should be changed to the more open-ended language indicated elsewhere. Thankfully, the available documentation includes several other recognitions that it could be a long-term need: Pages 25 and 54 in the *Hydrogeological report* state: “Surface water monitoring of stations in Hillside Creek, Tors Creek, Tok River and Tetlin Lake will be continued until confidence is achieved in the post-closure solute transport model predictions and the data confirm that long-term downgradient impacts will be as predicted.” Page 269 in the *Water Management Plan* states “The [groundwater] data will be reviewed after year 5 to determine any on-going post-closure monitoring requirements.” And finally, page 51 of the *Reclamation and Closure Plan* states “Site-wide monitoring systems would remain in place until Peak Gold demonstrates to ADNR and/or ADEC that they are no longer necessary.” I agree with the latter statements recognizing monitoring should be open-ended until it is certain results of surface and ground water sampling meet or exceed ADEC standards. I disagree with any suggestion that post-closure monitoring would have only a specified time period limited to 5-8 years. Indeed, Piteau Consulting's model indicates a possibility that manganese levels could be exceeded 200-years post closure (Page 118 Hydrogeological report, and see my second-last paragraph in this letter). This potential for elevated contaminant levels 200 years into the future should be further explained, with recommendations as to how it will be addressed.

According to Page 98 in the *Hydrogeological report* there is one ground water sampling well underneath the Main Waste Rock Storage Area, and no ground water sampling well underneath the North Waste Rock Storage Area. I suggest there should be more ground water sampling coverage under each of the waste rock storage areas.

There is a need for iterative and adaptive management that should be strongly reinforced in the plans for Monitoring, Water, and Reclamation, and Closure. Evaluation points in times well into the future should be specified. For example, in each annual report if there is any indication that actual results do not

match the patterns predicted during pre-mining surveys, these results will be further researched and evaluated. Adaptive changes would then be made to create the desired outcome or trajectory. A temporary halt to operations was mentioned due to changed economics, but, surprisingly, it was not stated that it would also be required if PAG or ML contamination outcomes appear to be worse than originally predicted. I did not see that aspect considered anywhere, and it should be.

#### WASTE ROCK MANAGEMENT PLAN (Appendix C to Monitoring Plan)

There was no peer review available regarding the Manh Choh geochemical characterization, nor was there any discussion that put the Manh Choh deposit in context with other similar ones in Alaska. SRK Consulting did provide an analogy to a similar deposit in Nevada (Page 290): “Sillitoe (2013) suggested that the gold-rich mineralization at the Peak zone was part of a reduced gold skarn system within a larger porphyry copper setting, most closely resembling the gold-sulfide skarn deposits mined at the *Fortitude deposit* in the Battle Mountain Mining District of central Nevada” (Sillitoe, R.H., 2013, *Comments on the Tetlin gold-copper project, Alaska: Private Report prepared for Contango ORE, Inc., September 2, 2013, 12p.*). I searched the literature to find out how gold deposits elsewhere, similar to Manh Choh, performed in terms of waste rock management and mine closure challenges. According to the Nevada Division of Environmental Protection (NDEP), the *Fortitude deposit* is currently being mined in stages and is being analyzed for expansion. As part of this analysis NDEP stated “The groundwater system will become a flow-through system with time and a pump back and treatment system would still be necessary after 200 years and would operate in perpetuity (<https://ndep.nv.gov/uploads/documents/NEV0087061dfsFY22.pdf>). I must re-emphasize “*treatment would still be necessary after 200 years and would operate in perpetuity.*” These words must be kept in mind when evaluating potential impacts of PAG and ML waste rock and tailings. These words must also be kept in mind when deciding the post-closure monitoring period and the amount of Financial Assurance required. Before a final permit decision is made, Kinross-Peak Gold, DNR and DEC must do further research about the success of mine closure and reclamation performance of similar gold-sulfide skarn deposits elsewhere.

Page 304 states “Blending will occur by end-dumping PAG materials over faces and will be controlled so that PAG materials are always dumped on NAG waste rock, and then over-dumped by NAG waste rock. The specifics of the blending approach *are being developed* to ensure that neither acid generation nor accelerated metal leaching occur beyond the grain scale” [italics added]. Is Manh Choh a first experiment in treatment of these types of PAG and ML wastes, or has success been demonstrated elsewhere? Kinross-Peak Gold and their consultants must provide literature citations showing it worked elsewhere in similar situations. The public and agencies need to be confident that this strategy will be successful. If no successful examples are available, what type of research can be done, *before permits are issued*, to show that this project will not be like the Nevada mine mentioned above, in which it’s anticipated that treatment will be required for 200 years, or in perpetuity?

In conclusion, the draft Alaska DNR Reclamation Plan Approval (F20232626RPA), and Alaska DEC draft Waste Management Permit (No. 2023DB0001) should not be approved until other alternatives have been considered, the four highly technical documents I listed receive outside and independent peer review, and further research is done to ensure there will be no release of PAG or ML at either the Manh Choh or Fort Knox sites. Otherwise, this project could risk becoming a superfund site.

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