

Jeff apple Benowitz
PhD Geology
PO Box 753851
Fairbanks, Alaska
99775

Manh Choh ore extraction site DNR/DEC permit comment
(manh.choh.comments@alaska.gov)

Dear **Ashlee Adoko**, Large Project Coordinator

I have combined my comments on both these permits/plans

Draft Waste Management Permit 2023DB0001
And
Draft Reclamation Plan Approval (F20232626RPA)

First off, I ask for DNR/DEC to **extend** the Public Review and comment period.

Currently the comment review-period was just one month in length, 2/10/23-3/13/23.

Given the huge community concern, demonstrated by the North Pole City Council, the Fairbanks City Council, and the North Star Borough passing resolutions of objection/concern over the Manh Choh mining plan, and given the large number of technical documents to digest, more time is warranted. These are government councils in **pro-mining communities** passing resolutions of concern/objection to this poorly designed and unregulated extraction-transportation-milling plan.

Fairbanks City Council Resolution 5021 (adopted 1/9/23)
FNSB Resolution 2023-13 (adopted 3/9/23)
North Pole City Council Resolution 23-03 (adopted 2/6/23)

The documents that need to be reviewed to be informed on this permit/plan consist of 100s of technical pages, tables, and figures. Even with a PhD in Geology I have struggled to review and integrate the documents in the limited amount of time provided.

At this time, I recommend DNR/DEC **reject** the permit/plan applications and have Kinross-Contango Ore-Peak Gold LLC address the concerns below where warranted. Furthermore, no decision should be made until the DOT Tetlin to Fort Knox Corridor transportation advisory committee finishes their report (<https://dot.alaska.gov/nreg/tetlintofortknox/committee.shtml>). This current project involves three parts, extraction at the Manh Choh site, transportation from Tetlin to Cleary Summit, and processing at the Fort Knox mill. The whole mining project needs to be evaluated before a DNR/DEC permit can be issued.

I am confident Kinross-Contango Ore-Peak Gold LLC can operate an environmental sound mine/processing mill at the Manh Choh site, once these and other concerns are addressed. Here I summarize my recommendations-comments below. Then I present some key reference materials that my recommendations/comments were built upon.

Summary Recommendations/Comments:

Theme #1: Tetlin to Cleary Summit Transportation-Fort Knox Processing

1) Kinross-Contango Ore-Peak Gold LLC should be required to perform a full Federal Environmental Impact Statement or State equivalent on the Tetlin to Cleary Summit Highway corridor ore transport plan and Fort Knox processing and tailings management plan. The highway is de facto part of the mining operation, just as ore transport on site is. The exhaust air pollution-both 2.5 and greenhouse gases, sound, burning tires, toxic fugitive dust, toxic ore spills, community health, food security, moose accidents, school bus stops, and medical transport concerns need to be addressed. Noise from the trucks should be measured at 40 below when sound travels further.

Additionally, there should be defined responsibility-liability for any injuries, etc. caused by flying ore/truck accidents.

2) Kinross- Contango Ore should be required to measure baseline Ph and concentrations of heavy metals along the Tetlin to Cleary Summit Highway corridor and weekly monitor the same sites during ore transport. The Red Dog mine road to Kotzebue is a good example of how this should be done. Kinross-Contango Ore should also bond the potential damage to both federal waterways, wetlands, infrastructure, and personal property. Kinross-Contango Ore should be required to station clean-up crews every 5 miles along the Tetlin to Cleary Summit Highway corridor for fast response when an ore spill happens and to keep this critical highway open.

3) Kinross-Contango Ore should in writing commit to not having ore transfer stations in the North Star Borough and bonding their comment-otherwise it is just words.

4) No DNR/DEC permit/plan should be given/approved until the bridges are replaced along the Tetlin to Cleary Summit Corridor. It is acceptable by all that these bridges need to be replaced before sustained safe ore transport can commence.

5) Alternatively, to transporting ore to the Fort Knox mill site, Kinross-Contango Ore could build a regional mill in Tok to serve all the potential mines (Northway, Taurus, etc.) we keeping hearing about in the area (Taurus, Hona, Eagle, Little White Man-LWM, Northway...).

Theme #2: Fiscal Ethics

6) There is a conflict of interest with Alaska state departments being the sole issuer of these permits, given the State of Alaska has invested \$10,000,000 into Peak Gold LLC. I request outside-Federal review of this permit/plan.

7) The current limited economic benefit to the Tok area. Only 2.25% royalty from the Manh Choh mine goes to the Tetlin Tribal Council. This is the lowest in the state for a mineral resource property owner- NANA corp gets 50% of the royalty from Red Dog is 50% to NANA. **Of the** Manh Choh resource of 867,740 gold ounces (\$1,478,628,960) the Tetlin Tribal Council will receive only **\$33,269,152** in royalties. This royalty percentage was reduced from 3.0% after Contango Ore paid \$225,000 for \$11,089,717 (0.755) of the gold stream. It appears there were fiscal shenanigans occurring that the U.S. Security and Exchange Commission should investigate. Alternatively, a local mill in Tok would provide the region a sustainable industry.

Theme #3: DNR/DEC permit/plan

8) Kinross-Contango Ore-Peak Gold LLC should be required to do a seismic hazard assessment for the Manh Choh ore extraction site and how it may or may not affect their waste management/reclamation plans before being awarded a DNR/DEC permit/accepted plan. The extraction site is located between active the Cathedral Rapids and Denali faults and the extraction-waste storage site has many documented faults-some likely seismically active based on the large number of earthquake epicenter located on the extraction property.

9) Kinross-Contango Ore-Peak Gold LLC should be required to do a bird-modeling assessment to see how creating a lake will change bird populations and how they will address such an increase in bird visitation to their toxic high pH lake laden with leached toxic heavy metals.

10) The lake fill plan for the south pit is flawed and needs to be revised. It is clear the water table in the planned extraction area is dynamic, hence PAG waste material will be exposed to the air, then submerged, then exposed, then submerged....and so on leading to potential major acid drainage run-off and acid generation. I recommend a standard cap and seal approach instead of allowing the randomness of weather to drive long term acid mine drainage.

11) The samples run for geochemical analysis are lower in Ag (silver) than the ore the mine plans to extract. The actual planned ore, with core depth numbers and Ag (gold) content needs to be run for geochemical analysis.

12) Kinross-Contango Ore-Peak Gold LLC should not be allowed to use untreated waste water for dust control. These waters could be heavy metal laden and acidic.

13) The south lake waste management plan/storage should be designed for at least a 100 years and budgeted for monitoring for at least a 100 years. Once these PAG materials are exposed and broken up-increasing surface area- they will continue to generate acid mine drainage for generations. The Nabesna mine is a good example of the long lasting environmental impact of mining a high sulfide skarn deposit like the Manh Choh skarn.

14) Kinross-Contango Ore-Peak Gold LLC will need to mill the ore to efficiently fit the material into trucks for transport. There is no discussion nor plan on where or how this will be done. This needs to be addressed before a DNR/DEC permit/plan is given/accepted.

15) There currently is no defined plan on how Kinross will process the Manh Choh ore nor a defined plan on tailings storage in the DNR/DEC permit application.

Details and references behind my recommendations/concerns

Theme #1: Tetlin to Cleary Summit Transportation-Fort Knox Processing

1, 2) Extraction-Transportation-Processing all needs to be permitted

Document: Manh Choh Project Reclamation and Closure Plan Revision 1

*Page 1: 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.*

This is the fundamental issue with permitting the ore extraction site at Manh Choh: It is only a small part of the integral Project environmental footprint, but Peak Gold LLC is trying to pull a fast one. The ~250 miles road from the Manh Choh to Fort Knox milling/tailings storage site needs to part of the permit-planning because of the significant threat to wetlands and community health from burning tires, vehicle exhaust, fugitive dust, and ore spillage. The ore is acid generating and laded with toxic heavy metals and no tarp system can withstand the common ~70 mph winds along the transportation corridor not to mention wholesale ore spills during truck accidents. Alaska has experienced 8,150 mining spills at hits major mines between 1995-2020, so any ore transportation plan has to acknowledge spill will happen. Red Dog is the best example in Alaska where the transportation road had baseline measurements made with continue monitoring.

Perhaps you are not aware that the sulfide content of the ore planned for extraction at Manh Choh is 5% to 15% by volume.

There is high potential for rapid onset acid mine drainage and heavy metal leaching beyond acceptable thresholds for both the mine site, ore transfer stations, and the transport corridor:

***Arsenic** (3300 ppm, relative to EPA drinking water threshold of **10.0 ppb**). Highest exceedances occur in in the skarn oxide and sulfide materials but all material types show some exceedance.*

***Copper** (1600 ppm, relative to EPA drinking water threshold of **1.3 ppm**). Predominantly elevated in the skarn oxide and sulfide samples.*

***Silver** (60 to 33,000 ppm, relative to threshold of **700 ppm**).*

Cadmium (1 ppm, relative to threshold EPA drinking water threshold of **5.0 ppb**). A few exceedances occur in each of the material types.

Cobalt (1 ppm, relative to threshold EPA drinking water threshold of 5.0 ppb).

Lead (63 ppm, relative to EPA drinking water threshold of **0 ppm**).

Silver (14 ppm, relative to EPA drinking water threshold of **0.1 ppm**). Exceedances occur within most material types apart from the calc-schist oxide.

Zinc (140 ppm, relative to EPA drinking water threshold of **5.0 ppm**).

References:

<https://www.contangoore.com/project/manh-choh>

Geologic Data page 12

<https://www.npca.org/articles/3109-new-analysis-examines-8-000-spills-at-alaska-s-5-largest-mines>

Mining spills Alaska

Manh Choh Geochem Baseline Report Final 12212021

<https://www.epa.gov/sdwa/drinking-water-regulations-and-contaminants>

Given Kinross's commitment to lower their greenhouse gas contributions, the Manh Choh extraction site to Fort Knox mill transportation plan (100-200 trucks a day) is egregious.

Document: Kinross announces details of its Climate Change Strategy

Toronto, Ontario, February 16, 2022 – Kinross Gold Corporation (TSX:K; NYSE:KGC) (“Kinross” or the “Company”) is pleased to announce details of its Climate Change Strategy (the “Strategy”) and greenhouse gas (“GHG”) reduction action plan, which includes the Company’s commitment to working towards the goals of the 2015 Paris Agreement.

Document: Manh Choh Project Reclamation and Closure Plan Revision 1

Page 5

Approximately 4,000 tpd of ore will be mined and hauled to the mine site’s ore loadout area, ore will be transferred into highway capable tractor-trailer trucks, and shipped to Fort Knox Mine, approximately 240 miles north, for milling and refining.

The project consists of three major components:

Haul road corridor including the Manh Choh Twin Road, Manh Choh Site Road material borrow sites, and the construction laydown area;

Mine site infrastructure including ore loadout facility, water treatment pad and

facility operations; and

The mining area including pits, waste rock dumps haul roads and stockpile areas.

Document: Manh Choh Project Geochemical Characterization Report Revision 1
Page 107

“The geochemical characterization study has indicated the potential for neutral pH metals leaching including arsenic, cadmium, copper, antimony, and selenium.”

<https://www.epa.gov/ak/fairbanks-air-quality-plan>

3) Ore transfer stations

Anyone who has driven up to Skiland or to the White Mountains to ride, knows how icy the curvy Steese Hwy often gets on the way out of town. Originally Kinross determined they would need to have to have an **ore transfer site** to move ore from the Richardson highway corridor trucks to different trucks to get up the final hill. Then when folks raised concerns about how this site would become a source for acid generation and toxic heavy metal distribution into our community-Kinross simply said....oh we are not going to do that....but like their DNR permit application it is clear they do not know what they are going to do. No matter what is written or said, an ore transfer site will be required. Even if their highway trucks can magically get up the hill to the Fort Knox mill- during blizzards trucks would pile up at the base of the hill and there would be a need to unload ore to keep the system moving.

Theme #2: Fiscal Ethics

6,7)

<https://www.contangoore.com/press-release/contango-ore-inc-announces-private-placement-financing-with-alaska-future-fund>

Gold 4.1/oz grade per ton; 6 million tons, 867,740 ounces of gold

Spot price 9/7/22 \$1704 an ounce

Tetlin Tribal Council gold stream royalty first four years 2.25% (reduced from 3.0% after Contango Ore paying \$225,000 for **\$11,089,717** in gold stream).

Sources:

<https://www.sec.gov/Archives/edgar/data/1502377/000119312510259067/dex101.htm>

Theme #3: DNR/DEC permit/plan

8) Seismic hazard review

In my review I could find no mention of earthquake/seismic hazards-considerations in any of Manh Choh **extraction** site permit/plan documents. The Manh Choh **extraction** site is ~40 kms from the Denali Fault, one of the most seismically active faults in the world which ruptured in 2002 with M7.9. (Eberhart-Phillips et al., 2003). The devastating Turkey quake for comparison was a M7.8.

The active Cathedral Rapids fault (Carver et al., 2010; Koehler et al., 2012; Bemis et al., 2012; 2015), a low-angle thrust, is ~15 kms to the north west of the Manh Choh extraction site and part of the Northern Alaska Range Fold and Thrust Belt seismic region which can generate M6 earthquake events (Doser et al., 2023). Doser et al. (2023) stated

“Recognition of this thrust fault system represents a significant concern in addition to the Denali fault for infrastructure adjacent to and transecting the Alaska Range.”

Not only is the Manh Choh extraction site located between two active major structures, but the region itself is dissected by faults (Fig. 1) (Avalon et al., 2013; Illig, 2015). Plotted earthquakes from the USGS earthquake catalog from 2000 to 2013 to 30 kms depth and > M2 demonstrate the mine site itself can experience seismic events (Fig. 2). How will the covering on the north pit respond to seismic events? Will the planned lake in the south pit drain during a seismic event?

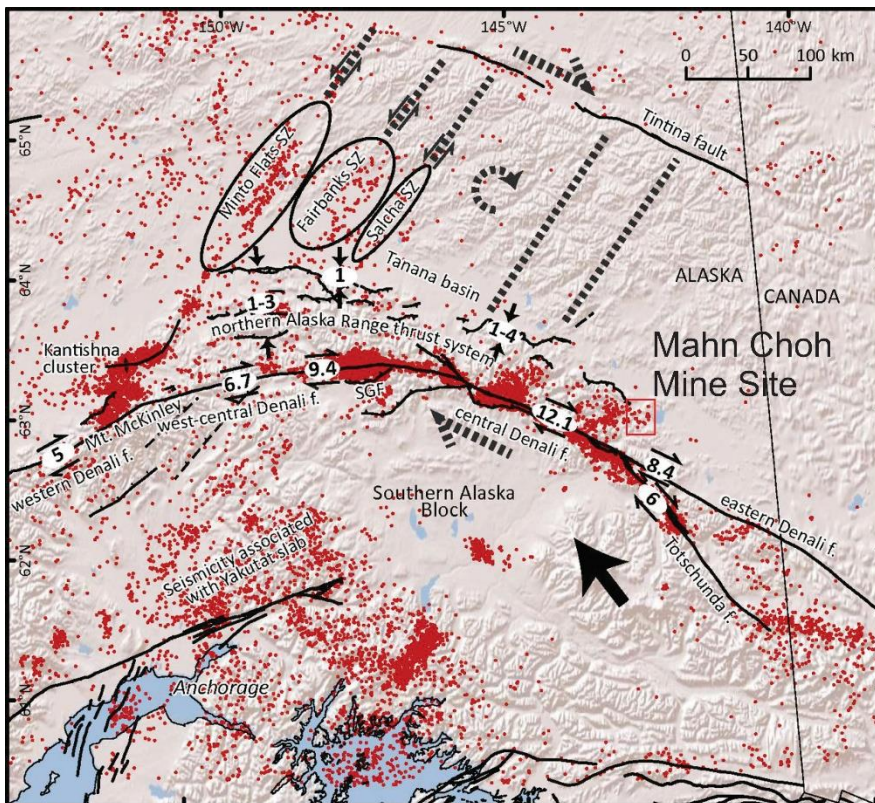


Figure 1: From Bemis, S.P., Weldon, R.J. and Carver, G.A., 2015. USGS Earthquake catalog: 2000 to 2013 to 30 kms depth and > M2. Red square general extraction area.

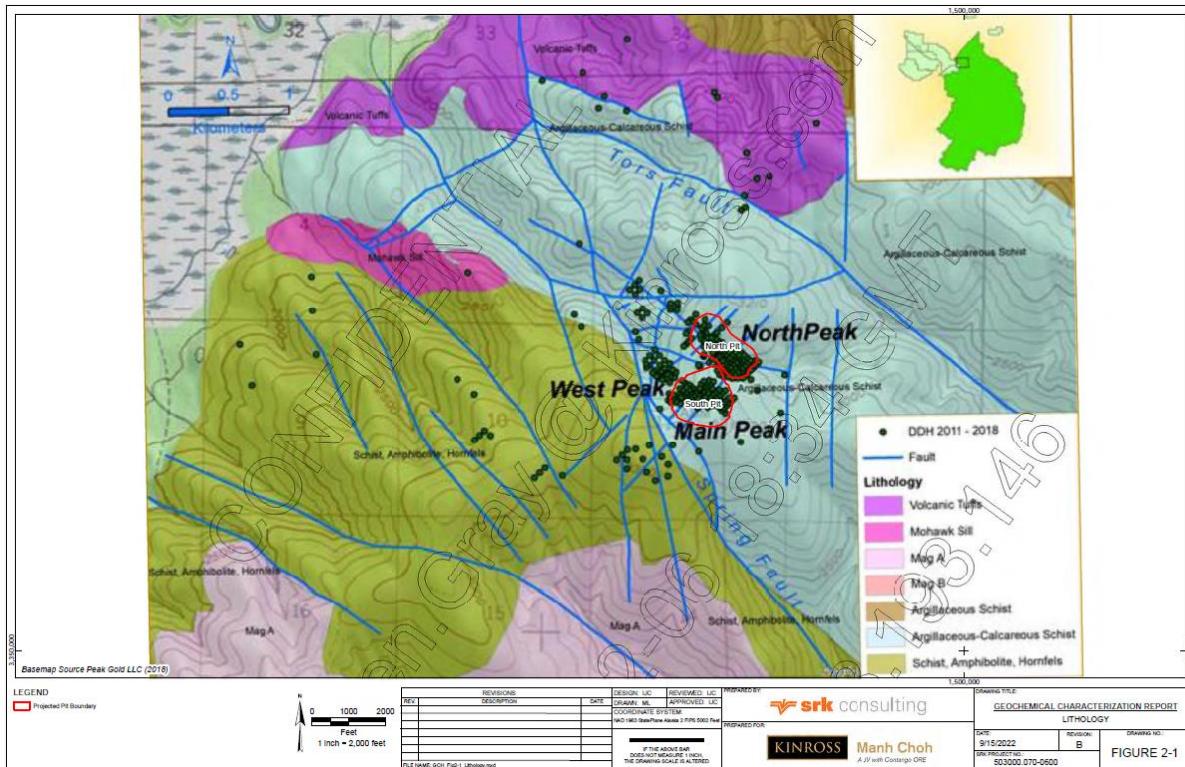


Figure 2: From Page 6 Manh Choh Project Geochemical Characterization Report demonstrating numerous faults crossing the extraction site.

References:

Avalon Development Corporation, 2013. Final Report for the Tetlin Project, Tanacross and Nabesna Quadrangles, Eastern Interior Alaska. Prepared for Contango Ore Inc.

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: *Geosphere*, v.8, no. 1, p. 196–205, doi:10.1130/GES00695.1

Bemis, S.P., Weldon, R.J. and Carver, G.A., 2015. Slip partitioning along a continuously curved fault: Quaternary geologic controls on Denali fault system slip partitioning, growth of the Alaska Range, and the tectonics of south-central Alaska. *Lithosphere*, 7(3), pp.235-246.

Carver, G.A., Bemis, S.P., Solie, D.N., Castonguay, S.R., and Obermiller, K.E., 2010, Active and potentially active faults in or near the Alaska Highway corridor, Dot Lake to Tetlin Junction, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2010-1, 42 p. <https://doi.org/10.14509/21121>

Doser, D.I. and Baker, M.R., 2023. Basement structure of the Northern Foothills Fold and Thrust Belt and southern Fairbanks and Salcha, Alaska Seismic zones and their relation to large ($M > 6$) earthquakes. *Tectonophysics*, p.229780.

Eberhart-Phillips, D., Haeussler, P.J., Freymueller, J.T., Frankel, A.D., Rubin, C.M., Craw, P., Ratchkovski, N.A., Anderson, G., Carver, G.A., Crone, A.J. and Dawson, T.E., 2003. The 2002 Denali fault earthquake, Alaska: A large magnitude, slip-partitioned event. *Science*, 300(5622), pp.1113-1118.

Illig, P.E., 2015. *Geology and origins of the peak gold-copper-silver skarn deposit, Tok, Alaska*. University of Alaska Fairbanks.

Koehler, R.D., Farrell, R-E., Burns, P.A.C., and Combellick, R.A., 2012, Quaternary faults and tolds in Alaska—A digital database: Alaska Division of Geophysical and Geophysical Surveys Miscellaneous Publication 141, 31 p, 1 sheet, scale 1:3,700,000. doi:10.14509/23944.

9) Revised bird modeling

The Tetlin Wildlife Refuge is ~90 kms away from the mine extraction site and a habitat for habitat for 30 resident and 96 migratory *bird* species that stop and breed during their migration path. The creation of a lake at the Manh Choh extraction site will attract birds during their migration and need to be evaluated and mitigated.

Reference:

<https://www.fws.gov/refuge/tetlin>

10) The lake fill plan for the south pit is flawed and needs to be revised.

The permit documents make a strong case that since there is limited groundwater the south lake water level will vary greatly with weather-seasonal events. Hence, the PAG waste rock planned to be stored here will be exposed, unexposed, exposed, unexposed, exposed and so on to air to be oxides. Thus, acid mine drainage will not only be created, but will overflow into drainages that are linked to the Tetlin Lake and Tok River hydrological systems. Given prediction of increased storminess-precipitation for interior Alaska (e.g. Thoman and Walsh, 2019) the creation of an acid lake is even more problematic with severe rain events and flooding predicted followed by periods of potential lake draw down creating a worst case scenario for acid mine drainage.

Reference:

Thoman, R. and Walsh, J.E., 2019. Alaska's changing environment: Documenting Alaska's physical and biological changes through observations. International Arctic Research Center, University of Alaska Fairbanks.

Document: Manh Choh Project Reclamation and Closure Plan Revision 1

*Page 18: Although no active permafrost is identified at the site, zones of discontinuous relict bedrock permafrost do occur, and act to further interrupt the movement of groundwater. The small amount of recharge that does occur is related to spring snowmelt. This causes seasonal increases in piezometric levels of 5 to 30 ft. **The relatively large seasonal fluctuation of groundwater levels is indicative of a low storage groundwater system.***

Page 34: PAG material will be submerged in the South Pit below the anticipated ground water level thus reducing the potential acid generation of the waste rock.

Page 35-36 The PAG material will be placed to a maximum elevation of 2955 ft amsl, below the expected ground water rebound water surface elevation within the pit. Storing PAG waste in a low oxygen environment (under water) will reduce ARD generation potential.

Document 3.10 Manh Choh Hydrogeological Characterization and Groundwater Modeling Report

A hydrogeological characterization study was conducted by Piteau Associates USA Ltd. (Manh Choh Project Hydrogeological Characterization and Groundwater Modeling Summary Revision 1, November 2022). Manh Choh Project Hydrogeological Characterization and Groundwater Modeling Summary Revision 1, November 2022 was submitted separately. Groundwater flow at the site is extremely low because of the dry conditions and limited recharge area. Any groundwater flow that does occur is localized and will percolate mostly through fractures, faults, and related small-scale structures. The limited overburden thickness and low bedrock hydraulic conductivity further reduces recharge; most precipitation runs off the site.

11) Ore samples not the high-grade ore to be processed.

Document: Manh Choh Project Geochemical Characterization Report Revision 1
Page 35

Ag numbers range from 3 to 5 ppm on average, but the high-grade ore is reported at Ag 14 ppm. Leachable heavy metals and sulfides track with ore grade, hence the actual high grade ore needs to be analyzed with core depths given and Ag numbers to be clear it is the actual high-grade ore.

<https://www.contangoore.com/project/manh-choh>

12) Using waste water for dust control

Given this waste water may have low pH and maybe laden with toxic heavy metals, Peak Gold LLC should not be allowed to use this waste water for dust control unless it is test and determined to be unharmed to flora, fauna, and people.

Document: Draft WASTE MANAGEMENT PERMIT for the Manh Choh Project
Page 3

Under AS 46.06.021, wastewater from dewatering wells and storm water runoff may be repurposed as a dust suppressant applied to mine roads provided that no puddling or runoff occurs.

13) 100 years of monitoring required for a Skarn extraction site

<https://www.nps.gov/wrst/learn/management/nabesna-mine-site-environmental-investigation-project.htm>

15) Fort Knox processing

There is no defined plan outlined in the DNR/DEC permit for how the ore will be processed at the Fort Knox Mill. They list 3 possibilities. There is no defined plan for how Kinross will store- nor monitor Manh Choh tailings at the Fort Knox site.

Document: Manh Choh Project Geochemical Characterization Report
Revision 1

Page 7

2.2.2 Ore Processing

Manh Choh ore will be transported to the Fort Knox Mine for processing. Tailings at Fort Knox are currently NAG and Kinross has explored the following three options for co-processing Manh Choh and Fort Knox ore:

- 1. 100% Manh Choh ore not blended with Fort Knox ore.*
- 2. 20% Manh Choh ore blended with 80% Fort Knox ore.*
- 3. 30% Manh Choh ore blended with 70% Fort Knox ore.*

*Kinross is currently proceeding with the option of batch processing Manh Choh ore separately to Fort Knox ore so no blending will be undertaken. Manh Choh and Fort Knox tailings will be stored separately. **The current plan** is to deposit the tailings from Manh Choh at the bottom of the Fort Knox pit and the tailings for Fort Knox will continue to be deposited within the existing tailings storage facility at Fort Knox. However, Kinross may consider also depositing some of the Fort Knox tailings at the bottom of the pit towards the end of the mine life.*