Mar 25, 2022

To: Matt Kelley, Senior Planner

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Attn: Matt Kelley,

Please include these comments to the Idaho-Maryland Mine DEIR.

ASUR PLAN ANALYSIS

PREPARATION OF ASUR PLAN

This plan has been developed by Rise Gold, Inc. in response to the comments from the Northern Sierra Air Quality Management District, NSAQMD: "Pursuant to Health and Safety Code section 41511 and the ATCMs (discussed below), the NSAQMD will require that an asbestos sampling plan be developed and approved by the NSAQMD prior to its implementation. It should at least meet the requirements and specifications of ARB Method 435 (see https://ww3.arb.ca.gov/toxics/asbestos/tm435/tm435.htm). This has not been done. No sampling plan has been developed and approved by the NSAQMD." (*Letter between Air Pollution Control Officer of NSAQMD and Matt Kelley, Senior Planner Nevada County, February 10, 2021*)

Rise Gold is listed as the author- no credentialed expert is credited even though they have a PhD Geologist on their team along with several Technical Advisors who are also geologists.

Rise Gold Inc. is incorporated in the state of Nevada. The state of Nevada does not require a license for geologists.

The sampling plan seems to be derived from "Air Resources Board Method 435, Determination of Asbestos Content of Serpentinite Aggregate (1991)". CARB also published the "*IMPLEMENTATION GUIDANCE DOCUMENT Air Resources Board Test Method 435 Determination of Asbestos Content of Serpentine Aggregate*" in April 2017 to further elucidate the complexities of asbestos testing in an effort to increase consistency and reliability between laboratories. The document states that: "If all parties involved in the collection, processing, and analysis of potential asbestos containing aggregate follow the guidelines specified in this document, more accurate and repeatable M435 asbestos content measurements will result." (*IMPLEMENTATION GUIDANCE DOCUMENT Air Resources Board Test Method 435 Determination of Asbestos Content of Serpentine Aggregate, April 2017, pp i-ii)*

Determine what, if any of these recommendations were implemented

The sampling and testing will be done by Rise. "Sampling and analytical testing will be done on or off-site by trained and qualified persons under the direction of a State Licensed Geologist" (*ASUR Plan*, *Item #6*, *document pg 14 or pg 16 of 131*). Laboratories analyzing asbestos are accredited by NLVAP (National Laboratory Voluntary Accreditation Program). A licensed geologist can work with an Air Pollution Control Officer to identify naturally occurring asbestos (NOA) and create a management plan.

Was the author of the ASUR Plan a California licensed geologist?

So, the parties involved in sampling and testing are not well established as written in the ASUR Plan.

Can the geologist perform testing themselves, train analysts to perform testing or supervise testing? Will any of this work be accepted in a court of law? TBD from a regulatory agency

Mossman is not a licensed Professional Geologist or Certified Engineering Geologist in the state of California. None of the following members of the Rise Gold management team could be found in DCA database for licensure: Thomas Vehrs, Bob Gallagher, Mike Andrews, John Carlile or Alan Edwards (all listed as directors or technical advisors: searches performed under EG-Certified Engineering Geologist, GEO-Professional Geologist, GP-Professional Geophysicist, HG- Certified Hydrogeologist, and MT-Metallurgical Engineer categories). They all have extensive experience in mining, especially international work.

Andrew Kopania (author of the *Groundwater Hydrology and Water Analysis for the Idaho-Maryland Mine Project*) along with Vieira and Kull (NV5 authors of the *GeoTechnical Reports for Centennial and Brunswick Industrial Sites*) were located in the DCA database in order to validate search abilities.

The *Asbestos Sampling Memo (June 2020)* was prepared by Richard Lippoth. He collected the samples from Rise, analyzed the laboratory data and prepared the report. No California licensure is found for him under the Board for Professional Engineers, Land Surveyors and Geologists, DCA.ca.gov He is a one man show at Vergence Geo Services, Inc. with his resume listing work with Freeman-McMoRan and Alexco, a shared history with the Rise management team. His qualification described in the *Asbestos Sampling Memo* June 2020 is listed as geologist, Mr. Richard Lippoth, Reg. SME. SME is a professional organization: the Society for Mining, Metallurgy and Exploration.

COMPARISON OF PCM TO PLM TO TEM MICROSCOPY TECHNIQUES

Multiple types of microscopy techniques will be used to analyze asbestos content depending on the application of the results. For instance, airborne asbestos monitoring for miners' exposure will use air filtration capture followed by phase contrast microscopy analysis.

Bulk materials will be screened for asbestos using polarized light microscopy followed by transmission electron microscopy analysis for rolling inventory maintenance.

"TEM is the preferred analytical method for outdoor asbestos samples because of its ability to detect small fibers (greater than or equal to 0.0002 microns in diameter) and to distinguish between asbestos fibers and non-asbestos fibers. The term "TEM structures" is often used to describe asbestos fibers detected by this method. TEM is the method recommended by the California Office of Environmental Health Hazard Assessment (OEHHA). However, TEM measurements cannot be directly related to the cancer potency factors because the studies upon which OEHHA's risk assessment was based used PCM analysis. Thus, the TEM measurements must be converted to PCM-equivalent units (OEHHA 2015.)" (*ASUR Plan*, *document pp 7 or pp 9 of 131*)

"Asbestos content by TEM structures will be converted into equivalent Phase Contrast Microscopy (PCM) units in accordance with the California Office of Environmental Health Hazard (OEHHA) 2015 Air Toxic Hot Spot Guidance Manual." (*ASUR Plan, Item #3, document pp 8 or pp 10 of 131*)

These different analyses each require unique sampling methods, sample preparation, sample sizes, and microscopy techniques. The results are not directly comparable between the methodologies.

PHASE CONTRAST MICROSCOPY (PCM)

"The most common methodology used for asbestos air testing is Phase Contrast Microscopy (PCM). This testing method involves using a PCM microscope to count the fibers present on the cassette filter in order to determine if the total fiber concentration is less than the EPA clearance level of 0.01 fibers/cc (fibers per cubic centimeter) "Asbestos sampling protocol cannot be used for objective data – OSHA." https://www.osha.gov/laws-regs/standardinterpretations/2015-10-07. Phase contrast microscopy enhances the contrast of transparent materials, while also filtering out background light. The air cassettes used for PCM contain a cellulose ester filter with a pore size of 0.8 um. Once the air sampling is complete, the sample is sent to an accredited laboratory. Alternatively, the samples can be analyzed on-site with a microscope for expediency, but these results will not be accredited. Whether in a lab or on-site, the filter is cut into a pie shape and prepped using a mix of vaporized acetone and triacetin. The sample is then placed on a PCM microscope where the fibers are counted up to 100 fields of view." (www.indoorscience.com, PCM vs TEM Asbestos Air Testing - Indoor Science, March 27, 2018)

Advantages:

- Technique is specific for fibers. It is a fiber counting technique which excludes non-fibrous particles from the analysis
- Technique is inexpensive and does not require specialized knowledge to carry out counts
- Analysis is quick and can be performed on-site for rapid determination of air concentrations of asbestos fibers
- Technique has continuity with historical epidemiological studies so that estimates of expected disease can be inferred from long-term determinations of asbestos exposure

Disadvantages:

- Test does not positively identify asbestos fibers. Other fibers may be included unless differential counting is used
- The smallest visible fibers are about 0.2µm in diameter while the finest asbestos fibers may be as small as 0.02 µm in diameter. For some exposures, substantially more fibers may be present than are actually counted.
- Cannot distinguish fibers less than 5 microns in length and 0.25 microns in width

This method is used for airborne fiber determination, not bulk material. It will probably be used for workers' exposure testing. Since OEHHA asbestos risk assessment has used studies involving PCM analysis, TEM results from bulk testing will be converted to PCM equivalent units.

POLARIZED LIGHT MICROSCOPY (PLM)

The following method description is excerpted from the Asbestos TEM Laboratories, Inc. cover letter dated Sep/17/2019 found in the *Asbestos Sampling Memo June 2020, pp 26 of 32*: "Sample preparation follows a standard CARB 435 prep method. The entire sample is dried at 135-150 C and then crushed to ~3/8" gravel size using a Bico Chipmunk crusher. If the submitted sample is >1 pint, the sample was split using a 1/2" riffle splitter following ASTM Method C-702-98 to obtain a 1 pint aliquot. The entire 1 pint aliquot, or entire original sample, is then pulverized in a Bico Braun disc pulverizer calibrated to produce a nominal 200 mesh final product. If necessary, additional homogenization steps are undertaken using a 3/8" riffle splitter. Small aliquots are collected from throughout the pulverized material to create three separate microsope slide mounts containing the appropriate refractive index oil. The prepared slides are placed under a polarizing light microscope where standard mineralogical techniques are used to analyze the various materials present, including asbestos. If asbestos is identified and of less than 10% concentration by visual area estimate then an additional five sample mounts are prepared. Quantification of asbestos concentration is obtained using the standard CALARB Method 435 point count protocol. For samples observed to contain visible asbestos of less than 10% concentration, a point counting technique is used with 50 points counted on each of eight sample mounts for a total of 400 points."

This is a generalized description of the PLM analysis method, actual processes are not documented in the Asbestos Sampling Report June 2020 for the individual samples.

Advantages:

- Basic identifications were first performed by light microscopy so there is a large base of published information against which to check analysis and technique
- Analysis is specific to fibers
- Analysis is quick, requires little prep time and can be performed on-site if equipment is available

Disadvantages:

- Not all fibers present may be seen. This is a problem for very low asbestos concentrations where agglomeration or large bundle of fibers may not be present to allow identification by inference.
- Method requires a great degree of sophistication on the part of microscopist. An analyst is only as useful as his mental catalog of images. Therefore, a microscopist's accuracy is enhanced by experience. The mineralogical training of the analyst is very important. It is the basis on which subjective decisions are made.
- The method uses only a tiny amount of material for analysis. This may lead to sampling bias and false results (high or low). This is especially true if the sample is severely inhomogeneous. (heterogeneity)
- Fibers may be bound in a matrix and not distinguishable as fibers so identification cannot be made

TRANSMISSION ELECTRON MICROSCOPY (TEM)

The following method description is excerpted from the Asbestos TEM Laboratories, Inc. cover letter dated Aug/15/2019 found in the *Asbestos Sampling Memo June 2020, pp 21 of 32: "*Sample preparation followed a standard CARB 435 prep method. The entire sample was dried at 135-150 C and then crushed to ~3/8" gravel size. If the submitted sample was >~1 quart, the sample may have been split using a 1/2" splitter following ASTM Method C-702-98 to reduce the sample volume for pulverization. The remaining aliquot, or entire original sample, was then pulverized in a Bico Braun disc pulverizer calibrated to produce a nominal 200 mesh final product. A representative ~60 mg aliquot of material was weighed out, and then placed into solution in a 500 ml beaker filled with distilled water. A known volume of the liquid suspension was filtered onto a 0.2 micron pore size Millipore mixed cellulose ester filter. The filter was then dried in HEPA filtered, Class 100 air on a clean bench. The filter was placed onto a glass microscope slide, sectioned, and collapsed in acetone. The collapsed filter was plasma-etched to remove10% of the filter surface and then carbon coated. The carbon coated filter was sectioned

and the sections placed onto 200-mesh copper TEM sample grids in dimethyl sulfoxide and acetone wick washers. After sufficient time to dissolve the filter material, the TEM sample grids were removed from the baths and placed into labeled sample containers.

TEM analysis was performed on a Philips CM-12 or JEOL 1200 transmission electron microscope operating at 80 or 100 kV. The sample was placed into the microscope where it was first scanned at low magnification to confirm that the distribution of material was reasonably homogeneous. High magnification analysis was performed using a two tier approach: 1) A relatively large area of several TEM grid openings for large asbestos fibers or fiber bundles, and 2) a relatively small area of a number of fields of view for individual asbestos fibers (fibrous particles exhibiting an aspect ratio greater than or equal to 3 to 1, and a length greater than or equal to .5 um). Detected asbestiform structures were subjected to detailed morphological and/or selected area diffraction analysis. If necessary, energy dispersive X-ray analysis was also performed. The length and width of each asbestos fiber was measured. From this data, a total volume and mass of asbestos observed in the scanned area is calculated, and extrapolated to a total weight percent asbestos for each sample."

At the top of the same letter is the statement: "Please find below the results for the TEM analysis of one or more bulk material samples. The analytical procedures were performed according to the EPA Test Method For the Determination of Asbestos in Bulk Building Materials - TEM method (EPA 600/R-93/116) modified for quantitative bulk soil sample analysis."

How was this method for bulk building materials modified for bulk soil sample analysis? These are rock cores.

In these analyses, an ~60 mg sample was suspended in 500 ml distilled water. Then a 0.5 ml aliquot was filtered for analysis. While TEM can identify fibers too small to be seen with PLM, the sample size is reduced by order of magnitude, 10^{-6}.

"Samples are first analyzed using PLM because a much larger (and likely more representative) mass of sample powder is analyzed using PLM than when using TEM. The mass of a M435 sample analyzed by PLM is approximately one million times greater than the mass of a TEM sample, but TEM has a resolving power of 500 to 20,000X magnification (compared to 50 to 1000X magnification by PLM). This higher resolving power enables TEM microscopists to distinguish and identify finer particles and fibers not seen with the use of PLM. For example, the California Department of Toxic Substances Control has used PLM, followed by TEM, as part of a tiered analytical approach to verify the absence of asbestos fibers determined by M435 PLM analyses in its Schools Program." (*IMPLEMENTATION GUIDANCE DOCUMENT Air Resources Board Test Method 435 Determination of Asbestos Content of Serpentine Aggregate, April 2017 pp 23-24)*

This is a "potential" quantity of mass available for analysis by PLM vs TEM, not the actual mass analyzed.

Advantages:

- Fibers can be accurately identified-ability to distinguish between asbestos and non-asbestos fibers
- Small fibers can be detected

Disadvantages:

- High resolution may be selective for a specific size fiber and exclude others
- Actual amount of material examined is magnitudes less than quantity examined by PLM
- Sample heterogeneity impacts overall representativeness

Bottom line is that these methods are not comparable due to differences in sample preparation and microscopy techniques. These analyses contain inherent bias due to sample variability (lack of homogeneity), differences in sample quantities tested, magnification levels and individual microscopists' expertise.

COMPARISON OF RESULTS FROM ASBESTOS SAMPLING MEMO (June 2020) TO ASUR PLAN TEM RE-TEST (Nov 2021):

For the 42 samples analyzed during August and September 2019, asbestos was detected in 4 samples, 9.5% of total samples. This included two blanks, two Centennial site tailings and 38 rock core samples. Two samples were analyzed by TEM and the remaining 40 samples by PLM. Asbestos was found in the two TEM samples and two of the PLM samples.

"In 2021, Rise requested the 40 samples previously submitted to be reanalyzed using the TEM method." (*ASUR Plan, document pp 7 or pp 9 of 131*).

Actually, the TEM reanalyses were performed at the urging of the air district: ["As the NSAQMD wrote in its July 10, 2020 comments "The NSAQMD recommends additional TEM analyses of the above rock types (serpentinite, weakly ankeritized diabase/serpentinite, weakly ankeritized serpentinite and ankeritized serpentinite) in order to facilitate refinement of the preliminary risk assessment". The NSAQMD still sticks to this recommendation"]. (Letter between Air Pollution Control Officer of NSAQMD and Matt Kelley, Senior Planner Nevada County, February 10, 2021)

In retesting of the 40 samples (two tailings and 38 pulp samples) analyzed by TEM, asbestos was detected in 14 samples. Unfortunately, the August 2019 samples tested by TEM were not retested by TEM in 2021. Thus, there is no quality control data regarding variability and reproducibility of results regarding TEM analysis between those two samples. The following chart is a comparison of asbestos found by TEM vs PLM. Detection limit for PLM is 0.25 weight% and the detection limit for TEM is 0.001 weight %. Non-detect samples from TEM re-testing have been excluded.

Sample Number	Date Reported	PLM Result weight % Detection Limit 0.25	TEM Result weight % Detection Limit 0.001	% Difference PLM vs TEM	Location and sample drill core length (inch)	PCM equivalent units weight %
Y962827	Sept 17, 2019	<0.25		139	I-19-14 4.8	
	Nov 10, 2021		1.4			0.021
Y962828	Sept 17, 2019	<0.25		120	I-19-14	
	Nov 10, 2021		0.062		3.6	0.0
Y962833	Sept 17, 2019	<0.25		92	I-19-14-A	
	Nov 10, 2021		0.092		3.6	0.0
Y962835	Sept 17, 2019	<0.25		112	I-19-14A	
	Nov 10, 2021		0.071		3.6	0.0
Y962836	Sept 17, 2019	<0.25		15	I-19-14A	
	Nov 10, 2021		0.29		3.6	0.0
Y962837	Sept 17, 2019	<0.25		134	I-18-11 4.8	
	Nov 10, 2021		1.27			0.018
Y962840	Sept 17, 2019	<0.25		50	I-19-14 4.8	
	Nov 10, 2021		0.15			0.001
Y962843	Sept 17, 2019	<0.25		193	Centennial	
	Nov 10, 2021		0.004		tailings	0.0
Y962847	Sept 17, 2019	<0.25		55	I-19-13 13.2	
Duplicate	Nov 10, 2021		0.44			0.028
Y962980	Aug 15, 2019	N/A	3.1	N/A	I-18-11	0.035
	N/A				10.8	
Y962981	Aug 15, 2019	N/A	2.0	N/A	I-19-13 13.2	0.028
	N/A					
Y962991	Sept 17, 2019	<0.25		142	I-18-11	
	Nov 10, 2021		0.042		6.0	0.042
Y962992	Sept 17, 2019	0.75		5	I-18-11 3.6	
	Nov 10, 2021		0.79			0.069
Y962993	Sept 17, 2019	<0.25		198	I-19-13A 4.8	
	Nov 10, 2021		0.0009 (0.001 at 3 sf)			0.003
Y962994	Sept 17, 2019	<0.25		63	I-19-13A 4.8	
	Nov 10, 2021		0.13			0.0
Y962999	Sept 17, 2019	2.5		164	I-19-13A	
	Nov 10, 2021		0.01		4.8	0.038

Overall, 16 samples, 40%, had asbestos greater than the TEM detection limit of 0.001 weight %.

Eight of the 40 samples, 20%, had asbestos >0.01 PCM equivalent units Weight %.

NOTE: sample Y962994 had a TEM result of 0.13 weight % yet zero result for PCM equivalent units. Data was notated: "Actinolite asbestos detected. Concentration per Millions of Fibers per gram: 29 for fibers >5µm in length. Possible contamination." This same situation occurs for samples Y962828, Y962833, Y962835, Y962836 and Y962843.

Two samples for TEM analysis originally sent to the laboratory on Aug 8, 2019 were described as rock cores with date analyzed as Aug 15, 2019. The 40 samples for PLM analysis were described as rock cores and were originally sent to the laboratory on Sept 3, 2019 with date analyzed as Sept 17, 2019. For retesting, 40 samples described as pulverized rock were submitted to the laboratory on Sept 14, 2021 with date analyzed as Nov 10, 2021. The two samples originally tested by TEM, Y962980 and Y962981, were not retested in November 2021. All of these samples were stored somewhere for two years before being retested. The actual age of the samples is unknown since drill core logs are not available. Rise performed exploratory drilling between 2017-2019.

SAMPLE POPULATIONS

Not counting the two grab tailings samples from the Centennial Site and the two blanks (carbonate landscape rock), the average overall length of the sample cores tested was 5.34 inches. Samples were from 6 of 19 (32%) of total cores drilled by Rise: 9 samples from I-18-11, 1 sample from I-18-12, 9 samples from I-19-13, 7 samples from I-19-13A, 8 samples from I-19-14 and 4 samples from I-19-14A. Drilling was stopped when asbestos was detected. Drill logs are not available; therefore, it is impossible to determine the depth or width of serpentinite deposits encountered. Asbestos sampling was extremely limited. Centennial tailings were only identified by a grid number-no information as to quantity, location, depth, etc. There are labeling errors: 1) *Asbestos Sampling Memo June 2020*, *Appendix A*- First photo is mislabeled Y962880 instead of the correct label Y962980 and 2) sample Y962838 is located on drill hole I-19-12 on Sheet 2

Mine Geology and Asbestos Samples (*Asbestos Sampling Memo June 2020*) but is listed as being from drill hole I-18-12 in the *ASUR Plan*, *Appendix C, pp 55 of 131*.

DUPLICATE ANALYSIS

Y962847 and Y962981 are duplicate samples. How does a result of 0.44 TEM weight % and 2.0 TEM weight % calculate out to the same PCM equivalent unit result of 0.028 weight%? (*ASUR Plan*, *Appendix C*, *document pp 57 of 131*)

These two separate samples Y962981 and Y962847 were quality control duplicates. These were two different samples, Y962981 was initially received as a rock core sample and was only analyzed by TEM on 8.15.19. The results yielded 22 chrysotile structures <5µm and 17 structures ≥ 5µm with a calculated asbestos concentration (weight %) of 2.0 (*Asbestos Sampling Memo, June 2020, Appendix B, pp 23 of 32*).

The duplicate sample, Y962847 was initially received as a pulps sample and was tested by PLM on 9.3.19 with <0.25% result. This sample was retested by TEM on 11.10.2021 and yielded 233 chrysotile structures <5µm and 10 structures ≥ 5µm with a calculated asbestos concentration (weight %) of 0.44 (*ASUR Plan, Appendix B for Asbestos TEM Laboratories Report, pp 110 of 131*).

Yet, the ASUR Plan lists these results as identical with the same Structures/nanogram at 3.0 and the same PCM Weight % at 0.028% (*ASUR Plan, Appendix C, pp 57 of 131*)

The weights used for sample preparation are 62.5 mg for Y962981 and 58.9 mg for 962847, a difference of 5.9%. But the difference in calculated asbestos weight concentration is 128%. Sample Y962847 has more than 10 times the number of chrysotile structures.

A 6% lower weight yields a 10 times higher structure count but the same PCM equivalent units????

Only one of these samples was included in the four total samples used to calculate the content in serpentinite samples. Which one? Who picks which one? Can the quality control sample, as a separate sample, be excluded from the analyses? (*ASUR Plan, Appendix C, pp 57 of 131*)

Comparing the results for the duplicate sample, Y962847, by TEM analysis yields 0.44% by weight compared to sample, Y962981 at 2.0% by weight, again yielding a 128% difference. Even using the same analytical test procedure (TEM analysis) yields unsatisfactory QC results.

NOTE: The only definitive conclusion from all of the asbestos testing is that:
asbestos was found in all of the serpentinite samples in addition to being found in samples of weakly ankeritized diabase/serpentinite, weakly ankeritized serpentinite, diabase and porphyrite at levels >0.01% PCM equivalent units (*ASUR Plan, Appendix C, pp 55-57 of 131*).

Grouping the samples by lithology in an effort to dilute the overall asbestos content of the group does not negate the asbestos content of the individual sample and its potential for harm. (*ASUR Plan, Appendix C, pp 54 of 131*)

QUALITY CONTROL ISSUES

The laboratory report for retesting of 40 sample by Asbestos TEM Laboratories, Inc. is labelled Report NO. 375516 rev.1

Why was the report revised? Where is the original for comparison?

Per documentation provided, no blind blanks or blind duplicates were performed. No documented cross check verifications from second analyst or second microscope were performed on individual samples. Two analysts performed the 40 sample TEM re-tests. The first analyst tested the first 18 samples, followed by the second analyst for next 13 samples, first analyst again for one sample, second analyst for remaining 8 samples. No time stamp for each sample, thus unable to determine if samples were analyzed in the order listed according to laboratory sample ID.

Two of the TEM samples had grid opening damage, Y962984 and Y962988.

Eight of the 40 samples were notated as having “possible contamination” with two types of contamination listed, chrysotile for two samples and actinolite for 6 samples. Twenty percent of the samples had “possible contamination”, 5% by chrysotile and 15% by actinolite.

TOXICITY

CHRYSOTILE VS AMPHIBOLE ASBESTOS

What if these samples did not have “possible contamination” but contained actual naturally occurring actinolite (amphibole) asbestos?

Upon retesting by TEM, ten samples (25%) indicated amphibole asbestos which has a much higher cancer potency than chrysotile asbestos.

Particularly controversial is the question of whether chrysotile asbestos is less potent for the induction of lung cancer than the amphibole forms of asbestos (e.g. crocidolite, amosite and tremolite), which has sometimes been referred to as the "amphibole hypothesis" (Cullen, 1996; Stayner et al., 1996; McDonald, 1998). This argument is based on the observation from experimental studies that chrysotile asbestos is less biopersistent (i.e. has a shorter half life) in the lung than the amphiboles… [The Working Group noted that the lower biopersistence of chrysotile in the lung does not necessarily imply that it would be less potent than amphiboles for lung cancer.] https://www.ncbi.nlm.nih.gov/books/NBK304374/

"The amphiboles are more likely to be associated with mesothelioma than is chrysotile, or white asbestos, which has a two to four times less potent risk of mesothelioma: however, the risk for development of lung cancer is equipotent for all types of asbestos. Chrysotile accounts for more than 99% of the world production of asbestos and commonly is contaminated with tremolite and other asbestos fibers." (Walker MD, Christopher, Pleural Neoplasms, Muller's Imaging of the Chest, 2019 Retrieved from ScienceDirect.com 02.22.2022)

POTENTIALLY TOXIC ELEMENTS

Potentially toxic elements (PTEs) hosted in asbestos elongate mineral particles is one of the factors that determines their toxic/pathogenic effects. Metals such as Fe, Mn, Cr, and Be are known to induce toxicity and contribute to asbestos related diseases. "…it is essential to quantify the toxic elements present in asbestos elongate mineral particles in order to prevent asbestos-related diseases." https://doi.org/10.1016/j.chemgeo.2020.119896

"Iron ions on amphibole types of asbestos react with epithelial lining fluid in the lung and generate reactive oxygen species that induce toxicity, and oxidant stress may lead to DNA damage. There is a direct relationship between biopersistence, which is determined by fiber length and chemical composition, and toxicity. Longer, thinner fibers are more toxic because they are not cleared by the AMs and therefore persist in the lung. Fibers longer than 15μm are particularly toxic and bioactive. They are not completely engulfed by the macrophages, leading to release of lysosomal contents, cytotoxicity, oxidant stress, and stimulation of inflammatory and growth factor pathways." (Harkema…Haschek, Fundamentals of Toxicologic Pathology, Chapter 14-Respiratory System (Third Edition), 2018 pp 351-393, Retrieved from ScienceDirect 02.22.2022 https://doi.org/10.1016/B978-012-809841-7.00014-9)

Many of these samples have high metals content, especially iron. Chart this

The data used for heavy metal toxic air contaminants in the Health Risk Assessment are all notated by the laboratory as being received and tested beyond the EPA recommended hold times of 28 days for mercury and 6 months for all remaining metals. Exploratory drilling began in 2017. Since the drill logs are unavailable, the exact sample dates for each core are unknown, but all samples were submitted and received by the gold assay laboratory on February 20, 2019. (Inorganic Extended Qualifier Reports pp. 389-407 and 458-484, Appendix D, Groundwater, Hydrology and Water Quality Analysis Report-Appendices)

After assays were performed, samples were then submitted to ACZ Laboratories for metal analyses. These analyses were performed in November 2019. This means that all samples were tested at least 9 months beyond their expiration date, probably more.

Shouldn't valid data be used when evaluating the health risks to the community from these TACs, especially when these metals have to ability to potentiate the effects of asbestos?

MATERIAL SAMPLING LOGISTICS

"The sampling will be done from the transfer point between the skip and silo and may be taken either manually or with an automated sampler." Illustrated by Figure 2 (*ASUR Plan*, *document pp 14 or pp 16 of 131*)

According to correspondence between the Air Pollution Control Officer of NSAQMD and Matt Kelley, Senior Planner of Nevada County on February 10, 2021, the APCO states: "A key component of method 435 is the protocol for collecting representative samples. It is improper to simply pull out the laboratory portion of Method 435 and say that Method 435 is being used. Method 435 states, "1.2 Applicability. This method is applicable to determining asbestos content of serpentine aggregate in storage piles, on conveyor belts, and on surfaces such as roads, shoulders and parking lots." Then it specifies even more clearly, "3 APPLICABLE SOURCES. This method can be used to obtain bulk material sources from three types of sources: 1. Serpentine aggregate storage piles. 2. Serpentine aggregate conveyor belts 3. Serpentine aggregate covered surfaces…In aggregate, a large degree of homogeneity has already been achieved during the aggregate's production."

Does pulling samples at the skip drop point into the silo meet the above stipulated criteria for Method 435 sampling, does this method qualify as a conveyor belt?

Who would be in the silo at point 3 in diagram as shown on document pp 14, (*ASUR Plan*) to obtain a sample manually?

"It is recommended that sampling be done at point closest to end of processing." (*IMPLEMENTATION GUIDANCE DOCUMENT Air Resources Board Test Method 435 Determination of Asbestos Content of Serpentine Aggregate, pg ii*).

This point in the silo may be adequate for barren rock samples but not tailings samples comprised of ore rock regarding the "point closest to end of processing," as stated above.

What will be the timing/spacing of the individual 3 samples taken for each composite per 1000 tons? Beginning, middle, end or every 333 tons? Beginning and end sampling method would mean that samples would overlap (beginning, end) and (end, beginning) samples per 1000 tons. Weighting sampling at these points would not be representative of the entire batches.

Will barren rock and ore rock be analyzed separately or combined in a composite (3 samples will be composited per 1000 tons of rock each day (*ASUR Plan*, *document pp 13 or 15 of 131*)? If barren rock and ore rock are to be placed in different compartments of the concrete silo, how will you be able to determine which material is contaminated, if asbestos content >0.01% PCM equivalent units is later found in the rolling inventory?

The concrete silo is divided into three compartments, one 1000 tons area and two 400 tons containment areas. The ore rock would flow through the larger compartment and then be conveyed to the ore processing plant for pulverization into tailings, while the barren rock would be loaded into haul trucks for transport.

How would you determine if the contaminated material was from the ore rock or the barren rock if the composited sample contains both materials? Rise would have to assume that all material from last non-detect test (per 1000 tons batch) to the next non-detect test (per 1000 tons batch) is contaminated.

Using a weighted average taken over three months of 1000 tons per day ore rock (90,000 tons) and 500 tons per day barren rock (45,000 tons) allows for significant dilution of asbestos per batch. Will an individual batch that fails TEM analysis be allowed to remain among the passing TEM analyses batches?

ROLLING INVENTORY MAINTENANCE LOGISTICS

Pg 13 (pp 15 of 131), ASUR Plan item 4: "Analytical determination of a materials status as Asbestos Containing Material would be done using Polarized Light Microscopy (PLM) in accordance with ARB Method 435 pursuant to 17 CCR 93106 (h)(2) with a detection limit of 0.25% asbestos"

Pg 13 (pp 15 of 131), ASUR Plan item 5: "Analytical determination of asbestos content, for the purposes of maintaining an Asbestos Inventory, would be done using Transmission Electron Microscopy (TEM) method in accordance with the EPA/600/R-93/116 method. Sampling for the Asbestos Inventory would be done by compositing at least 3 random grab samples from the barren rock or sand tailings for every 1000 tons of material."

But on page 8 (pp 10 of 131) of the ASUR Plan are the statements:

4) An Asbestos Inventory of all mined materials will be maintained and include a 3-month rolling average of asbestos content in equivalent PCM units.

5) An Engineered Fill Placement Plan will be maintained to ensure that adequate non-Asbestos Containing Material, as determined by PLM testing, is available for Surfacing Applications.

If all mined material is tested by TEM and converted to PCM equivalent units, then how can Rise maintain an Engineered Fill Placement Plan based just on PLM testing? There is no comparison or conversion factors of PLM measurements to TEM measurements. (Only TEM measurements are used to convert to PCM equivalent units)

"A rolling three-month weighted average of asbestos content of mined materials brought to surface and materials used as Engineered Fill will be maintained in the Asbestos Inventory. (*ASUR Plan, document pp 15 or 17 of 131*)."

"Arrangements will be made to ensure that analytical data is received and entered into the inventory within 2 weeks of sampling" (*ASUR Plan, pp 15 or 17 of 131*)

Will a new weighted average be calculated with each 1000 tons of material added to the inventory? WHERE WILL THIS MATERIAL BE STORED? WILL 1000 TON INDIVIDUAL BATCHES OF ORE ROCK ALONG WITH 500 TONS INDIVIDUAL BATCHES OF BARREN ROCK BE MAINTAINED? HOW MUCH MINING WILL BE PERFORMED DURING THAT TWO WEEKS OF TURN AROUND TIME? HOW WILL THE AMOUNT OF "POSSIBLY CONTAMINATED" MATERIAL BE DETERMINED?

For example, Y962847, would have initially passed the screening PLM method of testing. However, the material would have failed when tested by TEM during rolling inventory. Material surrounding this sample in the 90-day rolling inventory would be unfit for engineered fill or aggregate transport.

WILL THE SAME SAMPLE ANALYZED BY PLM BE RE-TESTED USING TEM OR WILL RANDOM SAMPLES FOR EACH TEST (PLM and TEM) BE UTILIZED?

FUGITIVE DUST EMISSIONS ABOVEGROUND

The 3-month rolling inventory will consist of 1000 tons of tailings for engineered fill per day multiplied by 90 days equals 90,000 tons plus 500 tons of barren rock for engineered fill per day multiplied by 90 days equals another 45,000 tons. 500 tons of tailings will be deposited underground in CPB.

How will the 500 tons designated for CPB be determined? How will this material be culled from the rolling inventory? (Assuming that any tailings containing asbestos would be the most suitable for underground CPB placement)

Where will this 135,000 tons of materials be stored and how will it be loaded for transport to Centennial, Brunswick or outside vendors? Have the fugitive dust emissions for the storage and loading been calculated and included in PM emissions analysis and incorporated into Health Risk Assessment model?

The Air Quality Report calculates emissions based on loading from an enclosed area: "Barren rock will be transported from the concrete silo using a series of chutes and conveyors to a fully enclosed truck loading building." (*Air Quality and Greenhouse Gas Emissions Analysis, Appendix B, Health Risk Assessment, Earthwork and Material Handling Nov 2021, document pp 24*) This statement does not account for rolling inventory procedures.

On document page 35, *Noise and Vibration Report, Rock Bin Conveyors and Barren Rock Loading* is the statement:
"The existing concrete rock silo will be reused. A chute and conveyor system will transfer barren rock from the silo into trucks for transport as engineered fill. The conveyor system and truck loading area will be inside a building adjacent to the headframe. A chute and covered conveyor system, approximately 335 feet long, will transfer gold mineralization from the silo to the process plant."

On document page 11, *Centennial GeoTechnical Report*: "The conveyor system and truck loading area will be inside a small building adjacent to the headframe."

On document page 14, *Centennial GeoTechnical Report, Table 4, Buildings* lists the Rock Truck Loading building as 1700 square feet with a maximum height of 20 feet.

Is the building large enough to accommodate the 45,000 tons of barren rock rolling inventory and room for front-end loading into haul trucks from that inventory? What is the ventilation system for this building?

On document page 36 *Noise and Vibration Report, Process Plant* is the statement:
"Gold mineralization hoisted from the Brunswick shaft will be placed in the existing concrete silo located on the Brunswick property before processing begins. Gold material will be transported from the concrete silo using chutes and conveyors to a fully enclosed process plant….Sand tailings (waste) from the gold recovery process will be dewatered and used for either backfill for the underground mine or stockpiled for transport and use as engineered fill. Sand tailing during backfilling will be transferred to the paste backfill plant, where particles will be dewatered and mixed with cement into a paste….Sand tailings not used for backfill will be either directly loaded into trucks in the process plant or stockpiled inside the building. Stockpiled sand tailings will be loaded into transport trucks with a front-end loader during daytime hours. Sand tailings not used as underground backfill will be transported for use as engineered fill."

(Document pp 39, *Noise and Vibration Report, Table 9 Hours of Operation*):
"Outside Truck Loading by Loader 7:00 AM-7:00 PM, 7 Days a Week, 80 years"

(Document pp 17, *Applicants Project Description, Table 7, Hours of Operation*):
"Outside Truck Loading by Loader 7:00 AM-7:00 PM, 7 Days a Week, 80 years"
This is confirmation of "outside loading" across documents.

Will this loading occur inside or outside? Will it be stockpiled inside or outside? If these procedures change due to maintenance of rolling inventory storage: will noise levels increase, will amounts of fugitive dust increase? What is the potential for all equipment and storage areas to be contaminated with asbestos? What level of asbestos found by TEM testing in the 90 day rolling inventory will trigger decontamination of all equipment: conveyor belts, processing plant, cement plant, etc.?

Will these two components of the engineered fill be kept separate? Otherwise, how will the engineering firm determine correct ratios for mixing to ensure stability upon engineered fill placement?

Recommendations from NV5:
"2. Crushed blast rock with a maximum dimension of 6 inches may be blended into the sand tailings to produce engineered fill material at a ratio of up to 2 parts blast rock to 1 part sand tailings. A rock and sand ration greater than 2:1 may be feasible but would not likely be testable using nuclear methods.
4. Onsite blending of blast rock and sand tailings may be performed by earthwork equipment (e.g., windrowing and spreading the rock and sand together in thin lifts). Specific procedures for onsite blending should be developed in conjunction with an NV5 representative during initial fill placement." *Centennial GeoTechnical Report*, document pp 13

Document pp 16, *Centennial GeoTechnical Report*: "Engineered fill may be mixed on site using mobile equipment to ensure uniformity and meet specifications for compaction."

FUGITIVE DUST EMISSIONS UNDERGROUND

"The walls and roof of tunnels composed of rock containing significant asbestos will be covered with shotcrete and the floor with be covered with either concrete or 3 inches of non-Asbestos Containing Material. Shotcreting would be done as part of the tunneling cycle or after completion of tunneling. Floor covering would be done after completion of tunneling (*ASUR Plan, document pg 10 or pp 12 of 131*)."

How much cement does this add to mine operations and subsequent GHGs? Hexavalent chromium deposition? What level of asbestos is considered significant to warrant shotcrete?

DEIR pg 3-38 Lists a "Shotcrete Machine" that will "Spray concrete into the walls of the galleries to prevent rockfall." Is shotcrete to be used on all tunnels and not just significant asbestos areas?

"Water generated from drilling and dust suppression during tunneling in Asbestos Containing Material shall be collected in sumps or tanks and shall not be used for Surfacing." (*ASUR Plan, document pp 11 or pp 13 of 131*)

(*ASUR Plan, document pp 12 or pp 14 of 131*): "#6. Rock loads will be wetted for transit between the tunnelling and dumping area and equipment will be washed regularly to prevent dust from being tracked out into other areas of the mine."

How will this water be treated to remove asbestos? What will be the volume of asbestos contaminated water?

MERV 16 filters will remove 95% of fibers...that still leaves 5 % ... Rise claims that only 1% of material mined will be serpentinite.

Will MERV 16 filters be limited to serpentinite mining only? What type of filters will be utilized in main ventilation system? What is the quantity of asbestos in the 5% of what total mined quantity of serpentine/serpentinite?

The *Air Quality and Greenhouse Gas Emissions Analysis Technical Report: Earthwork and Material Handling Fugitive Dust: Construction Activity Fugitive Dust Nov 2021 pp 300* of 1938 states that the Serpentinite Content of Mine Fill will be 14.3% with an Asbestos content of serpentinite at 0.20%.

The final total is 0.03% (14.3% x 0.20% = 2.86% ÷ 100 = 0.03%) ???????

HOW CAN THE MINE FILL BE 14.3% SERPENTINITE IF ONLY 1% OF MINED MATERIAL IS SERPENTINITE?

ENFORCEMENT OF ROLLING INVENTORY ASBESTOS CONTENT

"If the three-month rolling Asbestos Inventory for materials hoisted to the surface exceeds 0.01% asbestos by mass of PCM equivalent units the geology department will immediately investigate the source of the asbestos containing material and halt mining in the area of concern until a revised mine plan is prepared in compliance with the ASUR Plan (*ASUR Plan, document pp 20 or pp 22 of 131*)."

Document page 9, ASUR Plan needs further interpretation/clarification:

"If planned mining is projected to result in the Asbestos Inventory 3-month rolling average to exceed 0.01% by mass equivalent PCM units (1.07 TEM structures per nanogram)

i. Gold mineralization (intended for processing) will <u>not</u> be mined
ii. Barren rock from tunneling will either not be mined or mined using an auxiliary ventilation and dust collection system, as described in Section 6.1, designed to capture dust generated during the mining of these materials and prevent this dust from entering the main ventilation system and exhausting from the underground mine and a location for the underground disposal of this material will be specified and annotated on mine development plans."

SO, IF YOU ARE NOT GOING TO REMOVE THE GOLD MINERALIZATION, WHY WOULD YOU REMOVE THE BARREN ROCK SURROUNDING IT?

(*ASUR Plan, document pp 14 or pp 16 of 131*): "Records of all analytical testwork conducted will be retained for the life of the operation or a minimum of 7 years."

Once in the environment, asbestos does not degrade and will continuously be released into ambient air by wind or any soil disturbance.

Worker exposure occurs only during employment hours; however, community exposure occurs 24 hours per day. Workers choose to work in this environment with financial compensation. Workers are also provided training, respiratory protection, monitoring and health benefits while the community has none of these advantages.

The life of the operation or 7 years of record retention is not an adequate retention period since disease caused by exposure may not manifest for 20 years-these are human lives at stake NOT TAXES!

DUE TO IMPLICATIONS FROM LONG TERM EXPOSURE TO ASBESTOS, RECORDS OF ALL ANALYTICAL TESTWORK MUST BE RETAINED INDEFINITELY.

(*ASUR Plan, document pp 19 or 21 of 131*): #10: If required by the NSAQMD, the plan must include an air monitoring component."

(*ASUR Plan, document pp 20 or pp 22 of 131*): "A geological report will be prepared annually with a summary of all materials mined. The report will include a summary of quantities of rock mined by lithology. The report will include analytical asbestos sampling data and all receipts issued for Engineered Fill. The report will include any dust sampling taken during operations. The report will include the results of any air monitoring or asbestos bulk sampling conducted at the request of NSAQMD."

A team of third-party licensed geologists should be monitoring and recording the above data every day to be utilized for reporting. The majority of this work is being performed underground…who will know the difference after the material is extracted, crushed and placed as engineered fill or hauled away?

BESIDES A REPORT, WHAT ACTIONS WILL BE TAKEN? ARE THERE ANY PENALTIES FOR EXCEEDENCES?

Is this plan legally enforceable? What if Rise obtains all the necessary permits to begin mining and decides to sell those permits to a third party or what if Rise sells the mine itself to a third party in the future…will the plan be required for the new operator?

Rise has stated that they will leave the infrastructure at the Brunswick site.

What assurances does the county have that the infrastructure will be clean and free from asbestos, heavy metals and silica contamination?

CONCLUSIONS:

The addition of the 3-month rolling inventory complicates downstream processes tremendously. It has the potential to affect air quality through increased fugitive dust emissions which increase the quantities of the TACs (asbestos, silica and heavy metals) being released directly impacting the Health Risk Assessment results. The health of the community is at stake.

Asbestos emissions are now being calculated on the assumption that rock material will contain 0.01% asbestos as described by the ASUR Plan. However, the ASUR Plan cannot control the actual asbestos content in the material being mined, the plan can only try to control the distribution of material being used for engineered fill to a 0.01% asbestos content. The actual asbestos content of rock being mined is unknown and highly variable.

CAN YOU ASSUME THAT ALL MATERIAL (BARREN ROCK AND ORE ROCK) WILL BE ONLY 0.01% ASBESTOS WHEN CALCULATING EMISSIONS?

CLASSIFICATION AND QUANTIFICATION IS NOT POSSIBLE UNTIL AFTER TESTING BY TEM OCCURS. AND THAT INFORMATION MAY NOT BE KNOWN UNTIL TWO WEEKS AFTER EXTRACTION AND TRANSPORT TO THE SURFACE.

"The average asbestos content of the total mined material is of primary concern since asbestos does not have established acute noncancer effects (OEHHA 2020). Therefore, only the average asbestos emissions that could be generated over the long-term (per year), and associated long-term health risk, has been evaluated herein." (*Air Quality and Greenhouse Gas Emissions Analysis Nov 2021, document pp 36*) Rise now estimates these emissions at 0.01%.

This is the same logic regarding acute vs long term exposure for the community. "Asbestos is classified as a known human carcinogen by the US state, federal, and international agencies, as well as by the World Health Organization" (Walker). There is no safe level of asbestos exposure (*WHO*).

ANY asbestos released to the ambient environment regardless of an immediate quantity released has the potential for long term implications because asbestos does not readily degrade once in the environment. "It is one of the most pervasive environmental hazards in the world. (Walker) "We know very little about the rates of weathering and leaching of asbestos in soil environments, but the available information suggests that substantial reductions in the amount of chrysotile may take hundreds or thousands of years, depending on the soil environment, and somewhat longer for amphibole asbestos." (*GUIDELINES FOR GEOLOGIC INVESTIGATIONS OF NATURALLY OCCURRING ASBESTOS IN CALIFORNIA, Special Publication 124, 2002 pp 24*)

Thank you,

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