



December 6, 2021

Richard E. Tallman, PE  
Environmental Engineer, Bureau of District Mining Operations  
Pennsylvania Department of Environmental Protection  
5 West Laurel Boulevard  
Pottsville, PA 17901

**Re: Rock Hill Quarry, East Rockhill Township, Bucks County, PA**

Dear Mr. Tallman:

Attached please find a Technical Memorandum of November 13, 2021 wherein Erskine Environmental Consulting, Inc. (EEC) provides its response to three letters prepared by Hanson Aggregates Pennsylvania LLC and R.J. Lee Group: - Hanson, September 14, 2021 Rock Hill Quarry, Erskine Environmental Consulting, Inc. comments Hanson Aggregates Pennsylvania LLC SMP # 7974SM1 East Rockhill Twp., Bucks Co., PA, - Hanson, October 29, 2021 Elevated Review Technical Deficiencies Application No. 7974SM1C10 Rock Hill Quarry East Rockhill Township, Bucks County, Response to PA DEP April 12, 2021 Technical Deficiency Letter, and - RJLG, October 29, 2021, Technical response to the letter dated September 28, 2021 from EEC to Rockhill Environmental Preservation Alliance, Inc. (REPA).

Additionally, in response to communications about REPA and also to reiterate ongoing concerns regarding Naturally Occurring Asbestos (NOA) at the Rockhill Quarry, REPA submits the following comments to Pennsylvania Department of Environmental Protections (PA DEP) for consideration.

In the letter of October 29, 2021<sup>1</sup> to you, Hanson Aggregates Pennsylvania LLC (Hanson) made several statements regarding REPA's position on the Rockhill Quarry that we would like to address:

*“Apparently, REPA has absolutely no interest in credibly participating in this review.”*

This statement is patently false. REPA has patiently and respectfully participated in the review process for more than 2 years while PA DEP, time and again, granted Hanson 6 extensions, despite Hanson's repeated failure to adequately respond to PA DEP's deficiency notices. While PA DEP continued to allow Hanson to self-test and monitor, REPA engaged an independent, third-party, highly knowledgeable geologist with extensive experience in the fields of mining and asbestos<sup>2</sup>. For more than 2 years, Dr. Bradley Erskine of EEC has meticulously reviewed and provided non-partial, technical comments on Hanson, EMSL, EarthRes, and RJLG submittals.

*“REPA's comment also unfairly mischaracterizes the Department's role, which is not to shut down the Quarry, but rather to make sure Hanson's Quarry operations comply with Pennsylvania environmental statutes and the Department's regulations.”*

REPA has called on PA DEP, not simply to shut down the Rockhill Quarry but, first and foremost, to fulfill its responsibility to protect the health and safety of Pennsylvania citizens. The Mission Statement on PA DEP's website clearly states its primary role as "*The Department of Environmental Protection's mission is to protect Pennsylvania's air, land and water from pollution and to provide for the health and safety of its citizens through a cleaner environment.*" It does not state that PA DEP's role is to find a way to allow a quarry containing NOA, located in a residential neighborhood, to operate. By repeatedly extending deadlines, PA DEP has given Hanson more than ample opportunity "*to make sure Hanson's Quarry operations comply with Pennsylvania environmental statutes and the Department's regulations.*" To date, Hanson has not fully complied and further delays are unacceptable.

*"... REPA expressly stated that it "remains committed [sic] working with the Department to permanently cease operations at the Rock Hill Quarry."*

REPA, indeed, remains committed to working with PA DEP to permanently cease operations at the Rockhill Quarry, as any Pennsylvania citizen concerned with protecting the health of their family would. REPA continues to assert that, after all assessments and proposed mitigation plans have been completed, the following facts have not and will not change in the future:

- Asbestos is a known toxic and deadly carcinogen.
- NOA has been confirmed in the Rockhill Quarry and is pervasive throughout the diabase<sup>3</sup>.
- Since dust cannot be contained during a blast<sup>4,5</sup>, there is risk that asbestos fibers will be released into the environment during this mining activity.
- The type of hard rock found in the Rockhill Quarry cannot be wetted. After water used for dust mitigation during rock processing evaporates, asbestos fibers will remain in the environment. These fibers do not recognize boundaries and could be dispersed throughout the community beyond Hanson's property lines and monitoring equipment by air, water and/or trucks carrying stone, putting the community at risk for exposure.
- Material from the Rockhill Quarry will likely be sold and used for construction projects throughout the area. Unless purchasers and contractors who work with this material are notified that it contains asbestos, and OSHA regulations for the handling of asbestos in any amount are adhered to, no asbestos-related management, controls, or dust control procedures will be implemented at off-site locations. This creates potential exposure sources originating outside of the Rockhill Quarry site perimeter, putting a larger population at risk for asbestos related diseases.
- The most comprehensive, expert, plans for testing, monitoring and mitigation cannot guarantee that asbestos fibers will be contained within Rockhill Quarry boundaries.
- The Rockhill Quarry is located in a residential neighborhood where children, especially susceptible to asbestos related disease, live as close as 300 feet from mining operations<sup>6</sup>.
- The Pennsylvania Department of Health, whose Mission includes "... to promote healthy behaviors, prevent injury and disease...", recommends: "As it pertains to the health of citizens who live near the Rockhill Quarry, NOA is best to be avoided and left alone."<sup>7</sup>

Further delays will not change the facts listed above.

Critical questions remain. What is the disaster recovery plan should asbestos fibers exceeding threshold limits be released beyond quarry boundaries, whether it occurs inadvertently through human error, or in the course of daily operations? After monitoring determines that limits have been exceeded, how can any corrective action address the proverbial "closing the barn door after the horse is out", when real humans will have already been exposed, not just monitoring equipment?

Residents concerned with asbestos exposure from Rockhill Quarry operations have been waiting patiently and deserve action from PA DEP now. REPA, joined by numerous elected officials and environmental groups<sup>8</sup>, called for PA DEP, Secretary McDonnell and Governor Wolf to fulfill their duty to protect the people's "...right to clean air, pure water ..." under the law - Pennsylvania Constitution. Article I, Section 27. End the delays, deny Hanson their mining permit, and permanently cease all operations at the asbestos-laden Rockhill Quarry.

1. [10/29/21 Gutshall to Tallman, Re: "Elevated Review Technical Deficiencies, Response to PA DEP April 12, 2021 Technical Deficiency Letter"](#)
2. [Curriculum Vitae, Dr. Bradley Erskine](#)
3. [June 26, 2020, EEC Review of "Response to Comments – April 17, 2020 Department Letter"](#)
4. [4/25/2018 Rockhill Quarry blast video](#)
5. [11/1/2018 Rockhill Quarry blast video, with rock fragment containing asbestos](#)
6. [Children's Swing Set, ~300 feet from Rockhill Quarry mining operations](#)
7. [2/7/20 Letter, Commonwealth of Pennsylvania Department of Health Response to REPA's 1/21/20 Letter Expressing Asbestos Concerns](#)
8. [Letters calling for permanent closure of the Rockhill Quarry](#)

Respectfully yours,

Rockhill Environmental Preservation Alliance, Inc.

cc: The Honorable Thomas Wolf, Governor of Pennsylvania  
The Honorable Patrick McDonnell, Secretary, PA-DEP  
The Honorable Brian Fitzpatrick, U.S. Representative PA-01  
The Honorable Steven Santarsiero, 10<sup>th</sup> Senatorial District  
The Honorable Craig Staats, PA's 145<sup>th</sup> Legislative District  
The Honorable Diane Ellis-Marseglia, Chair, Bucks County Board of Commissioners  
The Honorable Robert Harvie, Jr., Vice Chair, Bucks County Board of Commissioners  
The Honorable Gene DiGirolamo, Bucks County Board of Commissioners  
Steven Baluh, P.E  
Marianne Morano, East Rockhill Township Manager  
Megan Banis-Clemens, Pennridge School District, School Board Member  
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John Stefanko, PADEP

# ***Erskine Environmental Consulting***

*Geologic Investigations Hazardous Materials Naturally Occurring Asbestos*

## **Technical Memorandum**

November 13, 2021

**Subject:** Response to Hanson and RJLG letters:

Hanson, September 14, 2021  
Rock Hill Quarry - Erskine Environmental Consulting, Inc. comments Hanson Aggregates  
Pennsylvania LLC  
SMP # 7974SM1  
East Rockhill Twp., Bucks Co., PA

Hanson, October 29, 2021  
Elevated Review Technical Deficiencies Application No. 7974SM1C10  
Rock Hill Quarry  
East Rockhill Township, Bucks County  
Response to PADEP April 12, 2021 Technical Deficiency Letter

RJLG, October 29, 2021  
Technical response to the letter dated September 28, 2021 from Erskine  
Environmental Consulting (EEC) to REPA.

Erskine Environmental Consulting, Inc. (EEC) herein provides its response to three letters prepared by Hanson Aggregates Pennsylvania LLC and R.J. Lee Group, referenced above.

To assist REPA and DEP in matching responses with comments, each letter was imported into WORD format, and the responses were inserted beneath the relevant comment text. EEC responses are colored red, and each response refers to the text that is colored black above the response. Please excuse formatting issues that accompanied the reproduction into WORD format from PDF format.

The October 29, 2021 submittal by Hanson responded to DEP's technical deficiency submittal, but included a section that responded to REPA and EEC submittals. EEC restricted its responses to those directed to EEC only, and did not provide comment on Hanson's responses to DEP's comments. Several responses to DEP comments were also included in one or more of the three letters directed at EEC, and therefore, were addressed in EEC's responses. In other cases, EEC has commented on subjects in previous memoranda, and DEP should be aware of EEC's position in those cases. Other subjects are outside of EEC's scope.

Please contact me if you have any questions.



Bradley G. Erskine, Ph.D., PG, CEG, CHG, CAC  
Erskine Environmental Consulting



**SENT VIA E-MAIL ONLY**

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September 14, 2021

Richard Tallman, P.E.  
Pottsville District Mining Office  
Pennsylvania Department of Environmental Protection  
5 West Laurel Boulevard  
Pottsville, PA 17901

**Re: Rock Hill Quarry - Erskine Environmental Consulting, Inc. comments  
Hanson Aggregates Pennsylvania LLC  
SMP # 7974SM1  
East Rockhill Twp., Bucks Co., PA**

Dear Mr. Tallman:

Hanson Aggregates PA LLC ("Hanson") provides this response to the August 10, 2021 response letter (the "Letter") submitted by the Rockhill Environmental Preservation Alliance, Inc. ("REPA"), which included a technical memorandum prepared by Dr. Bradley Erskine of Erskine Environmental Consulting ("EEC"). EEC opined on Hanson's July 6, 2021 submission (the "Response") and, in particular, the Mineral Identification and Management Guide (the "Mineral ID Guide"), the Asbestos Monitoring and Mitigation Plan ("AMMP"), and preliminary sampling results collected in air, water, and overburden locations at the quarry.

EEC is especially critical of what it perceives to be Hanson's proposed NOA counting methods. In short, EEC argues that Hanson is "selectively and systematically" undercounting asbestos fibers in rock and air samples based on length to avoid regulatory and public scrutiny. This is simply not true. All fibers, regardless of length, are counted by Hanson at the perimeter air monitors. All perimeter air monitoring sampling results are shared with the Pennsylvania Department of Environmental Protection ("Department") within twenty-four (24) hours of receipt by Hanson. There will not be a scenario where the Department is unaware of the presence of NOA at the perimeter based on any "selective" or "systematic" counting scheme.

EEC's continued deliberate attempt to portray Hanson as a poor environmental steward unconcerned with the health and safety of the environment, our employees, and our neighbors is inaccurate and improper. Hanson has not avoided any scrutiny: since the Department's December 5, 2018 order ceasing mining activities at the site, all of Hanson's correspondence with the Department and its site investigation activities have been posted and made available for public review.

Ultimately, EEC's memorandum contains many inaccuracies and statements meant to confuse analysis of Hanson's Response, Mineral ID Guide, and AMMP. Enclosed, please find a response prepared by Hanson and its experts to the EEC Letter. Hanson reserves the right to further respond to any issues in the Letter.

Regards,



Andrew J. Gutshall, P.G.  
Area Environmental Manager

encl: as stated

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# **HANSON AGGREGATES PENNSYLVANIA LLC**

## **RESPONSE TO ERSKINE ENVIRONMENTAL CONSULTING AUGUST 3, 2021 TECHNICAL MEMORANDUM**

September 14, 2021

### **I. GEOLOGICAL ASSESSMENT**

#### **Sampling Protocol**

EEC begins its response with a review of Hanson's sampling protocol. EEC suggests that, using Hanson's Mineral Identification and Management Guide, Hanson's protocol as a whole produces a bias that, through design, will result in the avoidance of sampling for asbestos rather than characterizing materials for the purpose of identifying rock units that may contain asbestos. That is incorrect. Hanson's protocol does not undercount asbestos. To the contrary, Hanson's Mineral ID Guide broadly defines "protocol fibers" to include ***all*** asbestiform amphiboles, whether they are regulated or not, including the asbestiform serpentine mineral chrysotile, and durable fibrous zeolites.

#### **EEC Response 1:**

The Guide states that other asbestiform minerals will be investigated, and provides only a few examples. However, the qualitative investigation did not investigate these other minerals. The report stated that the scope of work was restricted to NOA (naturally occurring asbestos), which, by definition in the report references, is chrysotile and each of the five "regulated" amphibole compositions. Thus, Hanson's own report refuted their assertion regarding an expansion of the definition of asbestos, and refutes their position that the Guide is not modifiable.

Hanson and their consulting laboratory, RJLG, consistently focuses on the term "asbestiform" as the primary property used to report or not report regulated amphibole fibers as asbestos. For example, in the text of RJLG's July 30, 2021 submittal of background test results, the cover page that accompanies the Final Laboratory Report states that a detected fiber "does not have characteristics of asbestiform morphology". RJLG has yet to identify, specifically, the characteristics that were used, and directs DEP to a set of definitions and passages in regulations and test methods. It can be concluded that the methods used are subjective, arbitrary, and not specified in test methods.

EEC provided, in previous memoranda, citations to written documentation by NIOSH, USGS and regulatory agencies concluding that there are no test methods that differentiate between asbestos fibers and "cleavage fragments" (differentiation based on crystallization morphology). There are no test methods or specific criteria or protocols within the analysis and reporting sections of standardized test methods that provide procedures to determine whether a population of fibers, particularly an individual fiber, crystallized in the asbestiform habit. In fact, the definition of "asbestos" and "asbestiform" is still controversial. A geologist or mineralogist may, in certain cases, collect sufficient data and provide an opinion as to whether or not a population or individual fiber may be a cleavage fragment, but an opinion cannot override or replace a positive test result.

In the submittal referenced above, RJLG contradicts their assertion that general characteristics of asbestos and asbestiform morphology may be used to selectively remove a fiber from the count. If RJLG chose to use properties that are included in the definitions of the ISO 10312 method, they would note that this test method defines asbestiform as:



3.5: Asbestiform: A specific type of mineral fibrosity in which the fibres and fibrils possess high tensile strength and flexibility.

Because the fiber in question likely possesses high tensile strength and curvature is not equivalent to flexibility, RJLG would either be required to deem the fiber as asbestiform, or choose to avoid this definition altogether and report the fiber as asbestos. If curvature is equated with flexibility, then the vast majority of fugitive airborne amphibole fibers sampled during asbestos removals in buildings could be deemed non-asbestiform, and therefore, per RJLG's assertion, not reportable as asbestos. This illustrates how general properties of commercial asbestos that are provided as "definitions" cannot be used to selectively remove particles that have been deemed asbestos as per the test methodology.

EEC's challenges to Hanson's Mineral ID Guide as "highly biased" and "modifi[able] where the results are averse to mining interests" are also incorrect and misconstrue the purpose of the Guide. Hanson has already submitted qualitative geologic survey reports that set forth an intensive assessment of the geology. (See Hanson reports dated August 14, 2020, and November 15, 2019). In conjunction with the reports, the Guide is designed to assist Hanson personnel in identifying other minerals that may contain asbestos, which can then be further analyzed to confirm its presence or not.

**EEC Response 2:**

Hanson states that EEC misconstrues the purpose of the Mineral ID Guide. EEC assumes that the purpose of the Guide is that which is stated in the Purpose section of the Guide. The Purpose section of the guide includes three paragraphs.

Paragraph 1 states:

"to assess whether "protocol minerals" (quotes not added by EEC) as defined below are present on a quarry site and to minimize the processing of such materials in a manner that may release undesirable mineral fibers".

This section focusses on "undesirable mineral fibers". Undesirable to who, and by what criteria? The use of this term avoids the central issue, and deflects from the purpose of interest: conducting an investigation to assess the location and concentration of asbestos to design a project that will not release asbestos in concentrations that are averse to worker and public safety.

Paragraph 2 states:

Some igneous and metamorphic rock materials have the potential to contain, as minor constituents, asbestiform minerals. Six of these asbestiform minerals are currently regulated as asbestos by USEPA, MSHA, and OSHA. The mineralogical properties of asbestos fiber and regulated mineral fibers covered by this Guide are hereinafter referred to as "protocol minerals". Materials suspected of containing protocol minerals are referred to as "suspect material."

This section avoids the use of the term "asbestos", and defers to "protocol minerals" as the basis of the investigation. This term is not used in asbestos regulations or test methods, and may be misused. Further, the Guide focuses on "suspect material", defined as materials suspected as containing "protocol minerals". Suspect materials are later defined as rocks that have visual evidence of asbestiform minerals. Thus, the Guide avoids sampling of rocks where asbestos is too fine to be visually observed, which eliminates the vast majority of rocks that contain asbestos.

Paragraph 3 states:

“This document is solely a guide and is not intended and shall not give rise to new legal obligations or standards. The procedures established in this guide may be varied in light of operational demands or restrictions. This guide shall not alter any applicable environmental, health or safety standards. All such standards shall be followed”.

This paragraph clearly states that the protocols can be varied based on operational demands or restrictions. Thus, the Guide is modifiable based on, for example, economic pressures.

The Guide creates a class of minerals called “protocol minerals” rather than using the standard term “asbestos”. The Guide defines “protocol minerals” as those crystallizing in the asbestiform habit, and there are no standardized test methods to differentiate habits.

**EEC Response 3:**

By Hanson’s own admission, the Guide avoids the term “asbestos” which is the subject of all asbestos regulations and test methods, and replaces it with an alternative class of minerals as defined in the Guide. Thus, the Guide is not designed to investigate asbestos. Further, Hanson admits that there are no test methods available to actually isolate and report “protocol minerals” only. Yet, Hanson/RJLG has continued to report “protocol minerals” only, using their unique definitions and undisclosed procedures.

Contrary to EEC’s suggestion, the Guide does not limit any counting of NOA at the quarry perimeter that must occur in accordance with Hanson’s AMMP. Regardless of whether a Hanson professional identified NOA in aggregate during quarrying activities, any emissions detected during sampling that exceed the asbestos detection limit of the TEM analytical method will be counted at the perimeter monitoring stations.

**EEC Response 4:**

It is not clear where “EEC’s suggestion” came from. The only reference in the Guide to air monitoring is that personal or area samples may be taken depending on test results. However, the application of the “protocol mineral” definition to air samples does, in fact, limit the counting of asbestos as required in standardized test methods for asbestos.

**Non-asbestiform Fibers**

EEC misconstrues the Mineral ID Guide by focusing on Hanson’s reference to cleavage fragments and their lack of association with asbestos-related diseases. According to EEC, this sentiment has been “refuted by NIOSH and the scientific community at large.” It is important to note that NIOSH is a research agency that does not regulate asbestos. EEC’s declaration is also demonstrably false. EEC ignores the National Institute for Occupation Health’s (“NIOSH”) conclusion in the *very report* to which it cites, wherein NIOSH unequivocally states that “uncertainty remains concerning the adverse health effects that may be caused by non-asbestiform EMPs.” See Asbestos Fibers and Other Elongate Mineral Particles: State of the Science and Roadmap for Research (April 2011), at 33.<sup>1</sup>

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<sup>1</sup> <https://www.cdc.gov/niosh/docs/2011-159/pdfs/2011-159.pdf>

EEC's selective excerpt from the NIOSH report is intentionally deceiving. As acknowledged by NIOSH, OSHA rejected including non-asbestiform tremolite, anthophyllite and actinolite ("ATA") in the scope of OSHA's asbestos standard. See 57 Fed. Reg. 24310 (June 8, 1992). In its regulatory proposal, OSHA first reviewed the available health effects evidence and preliminarily concluded that:

there are a number of studies which raise serious questions about the potential health hazards from occupational exposures to non-asbestiform tremolite, anthophyllite and actinolite.

55 Fed. Reg. 4943 (Feb. 12, 1990)

Thereafter, OSHA removed non-asbestiform ATA from its asbestos standard:

OSHA does not believe that potential asbestos contamination of nonasbestos minerals, including nonasbestiform ATA, is sufficient reason to include such nonasbestiform minerals in the asbestos standard.

57 Fed. Reg. 24310.

OSHA noted "that virtually no other participant endorses the NIOSH study as a basis for regulation." Id. at 24322.

Later in 2008, as acknowledged by NIOSH in its report, the Mine Safety and Health Administration ("MSHA") declined to expand its regulatory "asbestos" definition to include non-asbestiform minerals. See 73 Fed. Reg. 11283, 11296 (Feb. 29, 2008). NIOSH submitted a comment during the regulatory process expressing its concurrence with MSHA's decision:

NIOSH agrees with MSHA's decision not to modify its definition of asbestos within this particular rulemaking. NIOSH is presently re-evaluating its definition of asbestos and nonasbestiform minerals and will work with other agencies to assure consistency to the extent possible.<sup>2</sup>

Finally, in its 2011 report cited by EEC, NIOSH states:

NIOSH recognizes that its 1990 description of the particles covered by the REL for airborne asbestos fibers has created confusion, causing many to infer that the nonasbestiform minerals included in the NIOSH definition are "asbestos." *Therefore, in this Roadmap, NIOSH makes clear that such nonasbestiform minerals are not "asbestos" or "asbestos minerals,"* and clarifies which particles are included in the REL [recommended exposure limit]. (emphasis added).

See Asbestos Fibers and Other Elongate Mineral Particles: State of the Science and Roadmap for Research, at 33.

NIOSH concluded its report and review of various studies by stating that:

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<sup>2</sup> Comments of the National Institute for Occupational Safety and Health on the Mine Safety and Health Administration Proposed Rule on Asbestos Exposure Limit (October 13, 2005), *available at* <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.642.6028&rep=rep1&type=pdf>

[U]ncertainty remains concerning the adverse health effects that may be caused by nonasbestiform EMPs encompassed by NIOSH since 1990 in the REL for asbestos

and that:

NIOSH also wishes to minimize any potential future confusion by no longer referring to particles from the nonasbestiform analogs of the asbestos minerals as “asbestos fibers.”

Thus, EEC’s contention that NIOSH and the scientific community have refuted Hanson’s statement that cleavage fragments are not associated with asbestos-related diseases is patently misleading.

### **EEC Response 5:**

EEC’s comments are neither intentionally selective nor deceiving. EEC has provided to REPA and DEP independent and impartial third-party technical reviews of documents and responses submitted by Hanson, RJLG, EMSL, EarthRes, and other entities. EEC based its opinions on published documents by NIOSH, EPA, OSHA, MSHA, USGS, RJLG, and others, and provided references where others can place all comments and excerpts and photographs into context. Many were submitted in full as appendices. EEC’s opinions are, therefore, transparent and verifiable.

Hanson begins their rebuttal using excerpted text from the NIOSH Roadmap in reference to OSHA and MSHA regulations. This is misplaced: OSHA and MSHA regulations and test methodologies apply to worker protection only, and are not relevant to EPA’s positions and public safety. Regardless, Hanson, as they have throughout the process, focuses on terminology rather than potential health risk and testing protocols, and continues to selectively quote NIOSH and other references out of context. For example, Hanson reproduced a passage from page vii of the Executive Summary of the Roadmap and attributed it to the body of the text on page 33, where the issues are explored and clarified. The sentence that Hanson selected from the Executive Summary is:

*“NIOSH recognizes that its 1990 description of the particles covered by the REL for airborne asbestos fibers has created confusion, causing many to infer that the nonasbestiform minerals included in the NIOSH definition are “asbestos.”*

Reproduced below is the paragraph of the NIOSH Roadmap in its entirety from page 33 as referenced by Hanson. The portion of the text that is excerpted in the abstract is shown in normal unhighlighted text. In bold is the text that Hanson chose to avoid.

**“As described in the preceding sections, uncertainty remains concerning the adverse health effects that may be caused by nonasbestiform EMPs encompassed by NIOSH since 1990 in the REL for asbestos. Also as described in a preceding section, current analytical methods still cannot reliably differentiate between asbestos fibers and other EMPs in mixed-dust environments.** NIOSH recognizes that its descriptions of the REL since 1990 have created confusion and caused many to infer that the additional covered minerals were included by NIOSH in its definition of “asbestos.” NIOSH wishes to make clear that such nonasbestiform minerals are not “asbestos” or “asbestos minerals.” NIOSH also wishes to minimize any potential future confusion by no longer referring to particles from the nonasbestiform analogs of the asbestos minerals as “asbestos fibers.” **However, as**

**the following clarified REL makes clear, particles that meet the specified dimensional criteria remain countable under the REL for the reasons stated above, even if they are derived from the nonasbestiform analogs of the asbestos minerals.”**

Three conclusions can be drawn from the page 33 paragraph that Hanson referenced:

1. The first part of the paragraph highlighted in bold refutes Hanson’s and RJLG’s assertion that non-asbestiform fibers have been shown to be benign, and that there are test protocols that can differentiate particles on the basis of morphology,
2. The last part of paragraph highlighted in bold refutes Hanson’s and RJLG’s assertion that NIOSH and other agencies allow particles that may be or are non-asbestiform be eliminated from reporting, and
3. The middle un-highlighted part of the paragraph is focused on regulatory terminology only, specifically, “additional covered minerals”.

It can be further concluded, based on Hanson’s selective passages and avoidance to include text that contradicts their position, it is Hanson whose “selective excerpt from the NIOSH report is intentionally deceiving”, and it is Hanson’s arguments that are “patently false and misleading”.

## **II. ASBESTOS MONITORING AND MITIGATION PLAN**

As with his review of Hanson’s Mineral ID Guide, EEC’s criticism of Hanson’s Asbestos Monitoring and Mitigation Plan as seeking to avoid NOA is simply not true. With respect to Hanson’s corrective action threshold, EEC states:

DEP intended that all fibers that are  $\geq 0.5$   $\mu\text{m}$  be reported and the resulting concentrations be applied to any agreed upon perimeter threshold. **Hanson appears to be circumventing this directive, and intends to use a subset of particles rather than the whole data set.** (emphasis added).

Here, EEC conflates Hanson’s counting and reporting obligations with its corrective action threshold. Whether a corrective action is necessary is the result of a straight-forward, two step analysis. First, as stated above, Hanson will count all fibers greater than or equal to 0.5  $\mu\text{m}$  and will provide that data to the Department. Second, from that set of perimeter air data, Hanson will count those asbestos fibers that exceed 5 micrometers. The Department will be able to monitor the total amount of fibers counted (if any) and whether Hanson has taken any corrective action.

Still, EEC poses the question:

If EPA requires the reporting of all fibers, bundles, clusters and matrix structures that are  $\geq 0.1$   $\mu\text{m}$  for re-occupancy in school buildings, why would DEP feel it appropriate to selectively remove all fibers that are  $\leq 5$  for children who reside or attending school near the site?

This is a wholly inaccurate presumption. Per the Department’s direction, Hanson’s AMMP requires that, for all air samples, Hanson use ISO 10312-2019-10 “Ambient Air – Determination of Asbestos Fibers – Direct Transfer Transmission Electron Microscopy Method,” as modified by the United States Environmental Protection Agency’s (“EPA”) “OSWER Directive #9200.0-68, September 2008 Framework for Investigating Asbestos-Contaminated Superfund Sites (the “Framework”).” All asbestos fibers that are 0.5  $\mu\text{m}$  in length or greater will be counted. See Hanson

AMMP, Section 3.4 (Analytical Methods). Further, Hanson will provide all analytical reports to the Department within twenty-four hours of Hanson's receipt from the laboratory. See AMMP, Section 3.5 (Recordkeeping and Reporting). Finally, it is absolutely inaccurate to presume that the concentration measured at the perimeter of the property would be equivalent to the concentration measured at some undetermined distance.

To determine whether corrective action is necessary, Hanson has established a perimeter threshold based on the counting of asbestos fibers that exceed 5 micrometers in length. As Hanson detailed in its Response, this minimum 5 micrometer length threshold is the only asbestos fiber dimension that is associated with health risk.

This approach is also consistent with EPA's Asbestos Framework, which outlines two steps. First, EPA's Framework uses a general counting scheme to identify fibers that are 0.5  $\mu\text{m}$  in length or greater. Second, for the purposes of determining risk, EPA states "[a]ll fibers longer than 5  $\mu\text{m}$  with an aspect ratio  $\geq 3:1$  and a width  $\geq 0.25 \mu\text{m}$  and  $\leq 3 \mu\text{m}$  are used to estimate exposure and risk." Id., at 26. EPA's Framework employs an inhalation unit risk for asbestos derived for Phase Contrast Microscopy ("PCM") and PCM-equivalent ("PCMe") structures – that is, derived specifically for asbestos fibers that exceed 5  $\mu\text{m}$  in length. See id., Appendix C, at C-4. EPA aptly explains that the ISO 10312 method allows for the characterization purposes and for *recording* of all fibers to inform future analysis in the event that new toxicity models be developed, but recognizes that toxicity is analyzed only according to PCMe fibers. See id., at C-1.

With respect to its derivation of risk values for a continuous exposure scenario, EPA states:

As seen, risks (expressed as asbestos-induced cancer deaths per 100,000 people) are provided for exposure to **0.01 PCM f/cc** for a range of differing ages at onset (age at first exposure) and exposure durations, stratified by cancer type (lung cancer and mesothelioma) and by gender

See id., at Appendix E, E-2.

Thus, it is clear that, based on EPA Framework guidance, for the purposes of calculating continuous exposure, EPA bases its calculation on *PCM* fibers, which only counts fibers that exceed 5  $\mu\text{m}$  in length. This is consistent with EPA's Superfund practice: at the Ambler Asbestos Piles Superfund Site, EPA states the following:

To assess risk using TEM data, TEM results are reported as PCMe-equivalent (PCME) structures per cubic centimeter (s/cc) to ensure comparability to the toxicity data. PCME structures are defined as structures with a length greater than 5  $\mu\text{m}$ , a width greater than or equal to 0.25  $\mu\text{m}$ , and an aspect ratio (length:width) greater than or equal to 3:1. EPA performed a toxicological review of the validated sampling data to assess the level of risk associated with the potential inhalation of asbestos fibers under trespasser/recreational and maintenance worker exposure scenarios. **Only PCMe fibers were used to assess risk for this FYR, consistent with EPA Office of Solid Waste and Emergency Response (OSWER) Directive #9200.0-68, Framework for Investigating Asbestos Contaminated Superfund Sites, dated September 2008.**

See EPA Fifth Five-Year Review Report for Ambler Asbestos Piles Superfund Site (June 2017), at 12.<sup>3</sup> (emphasis added).

EPA stated the same with respect to the BoRit Asbestos Superfund Site:

The analytical method recommended by EPA OSWER Directive #9200.0-68, Framework for Investigating Asbestos-Contaminated Superfund Sites, for quantifying asbestos concentrations in air is transmission electron microscopy (TEM)- ISO 10312. EPA recommends the TEM-ISO method at Superfund sites, because it allows recording of all fibers to inform future analysis should new toxicity models be developed. The TEM-ISO method is used for the determination of the concentration of asbestos structures in air samples, and includes measurement of the lengths, widths, and aspect ratio (ratio of length to width) of the asbestos structures. During the RI, all ABS and ambient air samples were analyzed by TEM-ISO 10312. **Because the toxicity data used as the basis of the asbestos inhalation unit risk are based on analyses performed using phase contrast microscopy (PCM), TEM analysis results from the RI were reported as PCM-equivalent (PCME) structures per cubic centimeter (s/cc).** It is anticipated that TEM-ISO 10312 will continue to be used in any future air sampling efforts for the Site. However, use of TEM-ISO 10312 is not required by the ROD so that other sampling methods may be used at the Site if determined to be appropriate in the future. (emphasis added)

See EPA Record of Decision, BoRit Asbestos Superfund Site (July 2017), at 117.<sup>4</sup>

Consideration of asbestos fibers in excess of 5 micrometers to assess risk is entirely consistent with existing epidemiology and with EPA practice. EEC has seemingly acknowledged this in prior submissions to the Department, in which it approvingly cited to the following EPA comment made during the El Dorado Hills Asbestos Evaluation:

To present the 20:1 aspect ratio for commercial grade asbestos as a universal EPA policy, and to advocate its use as an appropriate standard for analyzing air samples of naturally occurring asbestos **is inappropriate and contradictory to use of the PCME dimensional criteria as a tool for assessing exposure risk.**

See Erskine Environmental Consulting Technical Memorandum (October 13, 2019), Appendices, at 7.<sup>5</sup> (emphasis added).

Hanson's proposed counting scheme and corrective action threshold are consistent EPA's Framework. Given that EPA clearly only considers the use of PCME asbestos fibers that exceed 5  $\mu\text{m}$  in length when analyzing risk, it is unclear why EEC states that Hanson's proposed method is not in conformance with EPA protocol.

#### **EEC Response 6:**

For many months, EEC has recommended that Hanson report all asbestos fibers as defined by procedures specified in applicable test methods, and refrain from eliminating fibers that are  $<5\mu\text{m}$  in length. It should be noted that Hanson resisted this approach, and is applying the ISO 10312 method counting fibers that are  $\geq 0.5\mu\text{m}$  in length only through a DEP directive. This simple reporting procedure should have been the project standard as far back as the geological investigation, and it is remarkable that Hanson has resisted it for so long. This is one reason why EEC has, and continues, to recommend that DEP revisit the geological investigation and manage the air monitoring program using independent third-party consultants that report directly to DEP.

Hanson acknowledges that they will report the concentrations as directed, but then omit the fibers that are  $\leq 5\mu\text{m}$  in length for the purposes of corrective actions. Hanson fails to recognize one of the primary purposes of perimeter air monitoring: preventative dust control. A central concept at asbestos sites, whether it be asbestos building material removal or disturbance on construction



sites, is that all fugitive asbestos should be reduced to the minimum levels possible, and then verify that the controls are successful using monitoring data. All particle sizes should be used to trigger response actions, and a subset be used for risk analysis purposes, as appropriate. This is another example where Hanson is applying protocols and procedures designed for one purpose, and applying them to another. Hanson's program allows mining to generate large amounts of uncontrolled asbestos-containing dust as long as the concentration of long fibers, a tiny subset of dust particles, do not trigger the 0.01 f/cc threshold. Exposure to asbestos by offsite residents should be at the lowest levels possible, and not simply pre-determined risk level. This simple concept helps prevent a cumulative exposure to asbestos from site activities combined with other sources.

### **Corrective Actions**

EEC opines that the:

AMMP should include a mandated set of response actions, such as increased dust control, reduced level of disturbance, or even shut down, depending on daily results or trends over several days.

EEC also states that "Hanson proposes using 0.01 f/cc as a corrective action threshold (but does not provide any specific corrective actions)."<sup>6</sup> As with its opinion of the Guide, EEC's theme is that Hanson should not be permitted to exercise any professional judgment, which is not a realistic suggestion. Hanson personnel are well trained and more than capable of implementing Hanson's corrective action scheme to the satisfaction of the Department.

EEC also quibbles with Hanson's use of the word "may" in the context of

[t]he corrective actions **may** include investigation of the source of any airborne asbestos, extra dust suppression measures, cleanup, repairs, or modifications to systems and controls, or temporary cessation of operations.

See Hanson Response, at 10(c). (emphasis added).

Simply put, Hanson's AMMP properly contemplates that professional judgment will be used to determine the necessary corrective action. More importantly – a point that EEC omits – the Department will be provided all Hanson sampling reports, all reports that indicate an exceedance of the corrective action threshold, and a report on the steps Hanson has taken to investigate and mitigate the response. **There will not be a scenario whereby Hanson avoids Department scrutiny.**

Per Hanson's AMMP, if Hanson identifies any sample in excess of 0.01 asbestos fibers/cc, Hanson will notify the Department within 24 hours of receipt of the laboratory results, commence daily air sampling of the identified location for seven (7) days, and investigate the cause of the results. Hanson will also take immediate corrective action measures, which may include *temporary cessation of operations*, and will provide a report to the Department within seven days of the steps it took to investigate and mitigate the source of the NOA.

It is unclear how Hanson's proposal differs in any material respect from that suggested by EEC. EEC's proposal would presumably remove any discretion of Hanson to assess any particular scenario and any ability of Hanson to coordinate with the Department.

EEC states that Hanson appears to be circumventing the Department's "request to report all asbestos fibers by applying a small subset of fibers for action item purposes," and that EPA makes no distinction between fiber length. EEC's criticism is unfounded. As discussed above, Hanson's



proposed action level is the same action level provided by the Department in its April 12, 2021 Technical Deficiency Level. EEC is also wrong in opining that EPA makes no distinction among fiber length when calculating risk. As stated above, EPA calculates a continuous exposure risk-based threshold of 0.01 PCM f/cc:

As seen, risks (expressed as asbestos-induced cancer deaths per 100,000 people) are provided for exposure to **0.01 PCM f/cc** for a range of differing ages at onset (age at first exposure) and exposure durations, stratified by cancer type (lung cancer and mesothelioma) and by gender.

See EPA Framework for Investigating Asbestos-Contaminated Superfund Sites, OSWER Directive #9200.0-68 (September 2008), Appendix E, at E-2. (emphasis added).

Finally, EEC contends that Hanson will only undertake mitigation of the “harmful” migration of asbestos fibers and that Hanson is not qualified to determine whether NOA emissions are “harmful.” That is incorrect. Hanson cannot avoid implementing corrective action on the basis of its determination that asbestos is not “harmful.” As EEC is well aware, Hanson’s AMMP implements a corrective action threshold that was formulated in consultation with DEP. EEC’s criticism is again wrong and misleading.

<sup>6</sup> This is the same target threshold value approved by DEP at the Specialty Granules Quarry (“SGI”). See SGI Asbestos Monitoring and Mitigation Plan, available at <https://files.dep.state.pa.us/RegionalResources/SCRO/SCROPortalFiles/Community%20Info/SpecialtyGranulesQuarry/01180301/SMPandNPDESPermits/Asbestos%20Monitoring%20and%20Mitigation%20Plan.pdf>

### **EEC Response 7:**

Hanson continues to refrain from describing what response actions will be implemented, and under what conditions. They state only that test results will be forwarded to DEP, and response actions may be implemented.

EEC previously suggested that a standard approach be implemented where specific response actions are specified when exceedances occur within a restricted time frame. The response actions are designed to target ineffective dust control, and not tied to risk. If adequate dust control is maintained and dust is minimized at the lowest levels possible, the risk will be also reduced to a level that is the lowest possible. For example, an exceedance may trigger review of the previous day’s activities and enhanced inspection. A second exceedance occurring during, for example, a five-day period may initiate increased dust control and perhaps targeted activity-based sampling. A third exceedance might indicate that there is a significant problem that is difficult to detect, and a work slowdown of some form, which would reduce emissions, may be needed until the problem is identified and solved. This system allows for a ramping up of dust control measures and inspection when exceedances occur, and a ramping back to “normal” activities when the exceedances are abated or do not continue.

The two approaches differ in one important aspect. Following Hanson’s approach, a decision that may increase dust control costs or slow production may be influenced by financial pressures. EEC’s approach where certain response actions are mandatory helps relieve this pressure. The best way to assure that dust control measures are being implemented and are adequate is to have the inspection and air monitoring programs conducted by third-party consultants that report directly to DEP.

## **Sampling Frequency**

EEC opines that daily monitoring must occur to ensure that dust control measures are effective and because the exposure risk is based on a continuous exposure scenario. Hanson has proposed to conduct perimeter air sampling on a bi-monthly basis. This sampling frequency is more than adequate to provide the Department with data to effectively monitor any NOA emissions at the perimeter of the quarry.

EEC's contention that Hanson's proposed bi-monthly sampling will not adequately capture variability in operational and weather conditions is unfounded. As Hanson states in its AMMP, during full quarry operations, a permanent weather station will be installed to monitor, among other information, wind speed and wind direction, and this data will be provided to the Department. During 500-ton removal operations, Hanson will collect a sample prior to operations and during the entirety of the 500-ton removal event (likely to last one day). As Hanson's experts have properly concluded, a risk-based threshold based on a continuous exposure assumption does not require that exposure be assessed on a continuous, instantaneous basis.

### **EEC Response 8:**

A permanent weather station will greatly enhance Hanson's ability to interpret perimeter data. However, it provides no information regarding asbestos emissions or perimeter concentrations during days where the perimeter is not monitored. The overall dust control program and assessment of potential risk cannot be evaluated without a robust program of daily monitoring where the results of each day are interpreted using the wind data. Once a sufficient number of samples that represent all climatic conditions and all mining activities are collected, the frequency of sampling may be reduced incrementally as long as the frequency is sufficient to verify that they are representative of the climatic and activity conditions. In no case, however, are two samples per month adequate to verify that they represent the other 28 days of the month where monitoring had not occurred.

## **Analytical Methods**

EEC criticizes Hanson's AMMP as deceptive because it gives Hanson the ability to petition the Department to use NIOSH 7402 in place of ISO 10312. EEC suggests that Hanson is attempting to "circumvent" the Department's directive to count all fibers that equal or exceed 0.5  $\mu\text{m}$ . Once again, EEC's criticism is wrong and misleading. As Hanson has explained above at length, Hanson will count all fibers at the quarry perimeter during air sampling events and will provide the Department with those results. In any event, Hanson's AMMP only permits Hanson to petition the Department to discontinue using ISO 1312 after *three years*, at which time the Department will have a comprehensive set of data to consider.

### **EEC Response 9:**

NIOSH 7402 eliminates all short fibers (<5 $\mu\text{m}$ ) and eliminates all long thin fibers (widths that are <0.25 $\mu\text{m}$ ). Thus, only a small subset of asbestos particles will be reported. When Hanson's consulting laboratory applies additional criteria to eliminate particles that have been deemed to be non-asbestiform, which is not possible to do using ISO 10312 and NIOSH 7402, the subset that is reported becomes even smaller. The reporting of a small subset of particles will, in fact, circumvent the referenced directive that all fibers that are >0.5 $\mu\text{m}$  be counted and reported.

## **Activity Based Monitoring**

EEC opines that "one purpose of [activity based monitoring] is to characterize emission rates of each activity and apply them to air models designed to calculate a risk-based project perimeter

threshold.”

As a preliminary matter, activity based monitoring that occurs in the proximity of the quarry operations will not limit any monitoring and sampling that occurs at the perimeter of the quarry. Instead, activity based sampling will complement perimeter air monitoring analyses with data collected more closely to the specific operations discussed in the AMMP. See Section 4 (Activity-Based Air Monitoring).

#### **EEC Response 10:**

Another purpose of ABS is to assess the emissions from each disturbance activity to help identify appropriate dust control measures or verify that the dust control measures are adequate. In Section 4 of the AMMP, Hanson identified four activities that will be monitored: blasting, drilling, haul roads, and crushing/processing equipment. Only blasting is monitored down wind of the activity. No such requirement is given for the other three, allowing monitoring to be conducted crosswind or upwind where fugitive particles will not be present. All ABS stations should be placed down wind and as close to plume-center as possible.

Hanson’s ABS program is incomplete. Absent are activities that are among the highest dust emission sources, including excavation, bulldozing, and loading, where heavy steel-track equipment crushes and pulverizes rock continuously. Each major source of emissions should be monitored.

#### **ISO 10312 Results**

EEC suggests that Hanson’s preliminary test results “show that there are no offsite sources of asbestos, and any asbestos detected during operations will be fully attributed to those operations.” EEC’s assertion is unfounded and misconstrues Hanson’s proposal.

As Hanson explained at length in its Response, Hanson will collect perimeter data at the quarry and extrapolate from that data any risk of exposure. Perimeter data provides the most accurate data as it relates to NOA from the Rock Hill Quarry, offers the most conservative background assessment scenario as it relates to offsite receptors, and provides readily comparable data against which Hanson can assess any incremental risk posed by future detections of NOA. Hanson’s determination to extrapolate risk based on detections (if any) of NOA at the quarry perimeter also accounts for the impracticality of tracing asbestos encountered far offsite back to an original generator.

Although EEC acknowledges that “the dispersion of asbestos and reduction of concentrations with distance is well known,” EEC apparently dismisses that reality when it alleges blank attribution and liability on Hanson for all asbestos found in the community. Rather than offer any analysis to counter the fact that asbestos does not significantly migrate from its source, EEC practices a simple exercise of process of elimination. Here again, EEC is contradictory in its speculation that all NOA would come from the site based on a very limited number of samples while elsewhere criticizing the AMMP as inadequate in terms of the number of samples to be collected. The background sampling conducted at the site cannot be used to definitively say that NOA detected at other distant locations should *per se* be attributed to Rock Hill Quarry. There can be no attribution as to the source of NOA detected at some other attenuated off-site locations without additional background analysis at that particular location. Like the rest of its commentary, EEC’s statements are misleading, inaccurate and unhelpful.

### **EEC Response 11:**

EEC's statement that the very low levels of asbestos at the site when no activities were occurring indicate that there were no offsite sources of asbestos that migrated onto the site at that time. If no asbestos is migrating onto the site from offsite sources, then it follows that any asbestos measured in perimeter stations must have been generated by site activities. This is quite fundamental, and EEC did not imply anything more.

### **Special Handling of Toxic Material**

EEC mischaracterizes the distribution of actinolite asbestos as "pervasive" throughout the diabase based on the petrographic analysis provided by the RJ Lee Group. There is no indication in that report as to the distribution of actinolite asbestos within the deposit and the report is entirely limited to the three samples examined. Further, the report describes the occurrence of fibrous amphibole within the limited number of rock samples examined to be present only in the two samples containing mineralized veins and areas immediately adjacent to the veins showing alteration of pyroxene to amphibole. One sample with no mineralized veins present was found to contain a small amount of non-fibrous amphibole indicating that not every sample analyzed contained NOA. Finally, to use this single analysis to indicate that NOA is "pervasive" throughout the deposit, while elsewhere criticizing the sampling of the deposit as being qualitative and inadequate is hypocritical. This result indicates the utility of performing a qualitative assessment in that suspect material was recognized in a hand sample, analyzed using microscopy, and found to contain NOA. This provides useful information to the professionals on site to guide site operations and/or additional sampling.

### **EEC Response 12:**

The interpretation that actinolite is pervasive throughout the unit was based on more than the RJLG report, and is consistent with fundamental geologic and mineralogic principles. EEC predicted that actinolite should be pervasive, and recommended that a petrographic analysis be conducted, and the RJLG report verified the interpretation. It should be noted that the RJLG mineralogist who conducted the analysis did not refute this conclusion in his review and comment on EEC's report.

It is instructive to place this issue into context:

The EarthRes geologist who conducted the qualitative investigation stated that the diabase was homogeneous, but that there was no visible evidence of post-crystallization metamorphism that could form asbestos. EEC showed that this second assertion (metamorphism) was incorrect. The fact that the diabase was cross cut by actinolite veins and actinolite was present in the rock unit indicates that the diabase was, in fact, subjected to post-crystallization metamorphic event. EEC also pointed out that the presence of actinolite in rocks where actinolite should be absent (diabase) indicates that the diabase was subjected to greenschist-facies metamorphism on a regional scale (greenschist-facies owes its name to temperature and pressure conditions that crystallize actinolite, the green amphibole, as the key index mineral). EEC predicted that actinolite would be present on a microscopic scale, and recommended that a petrographic analysis be conducted.

EEC interpreted photographs of thin sections that were submitted by Advance Testing (EEC document (June 26, 2020)). The photomicrographs showed clear evidence of a post-crystallization event: cores of primary pyroxene were enveloped by a reaction rim of a secondary mineral, possibly actinolite. The mineralogy of the metamorphic rim was not identified by the petrographer.

RJLG conducted a detailed analysis of thin sections and rock samples using SEM that showed the mineralogy in situ. The data clearly showed that the diabase had been subjected to a post-crystallization metamorphic event, with pyroxene being replaced by asbestiform actinolite.

Collectively, the data show that the diabase had been subjected to regional greenschist metamorphism that crystallized fibrous actinolite at the expense of pyroxene, and actinolite is expected to be pervasive and ubiquitous throughout the rocks at the quarry. This is supported by the field observation of actinolite, TEM test data that reported actinolite asbestos, petrographic analysis of thin sections showing reaction rims of actinolite at the expense of pyroxene, SEM analysis showing in situ replacement of pyroxene by actinolite, and fundamental geologic and mineralogic principles.

Hanson appears to be refuting this interpretation by dismissing all data that was provided by their own consultants, including their qualitative assessment. If DEP has any reason to doubt this interpretation, EEC recommends that the data be provided to a third-party geologist who has a strong academic foundation in field geology, metamorphic process, and metamorphic petrology. EEC is confident that a qualified geologist will agree with its interpretation.

As for the qualitative geologic report, EEC continues to feel that the initial investigation did not fully characterize the site, and that it be re-investigated using a third-party geologist that reports to DEP and has no significant ties to the mining industry. EEC is confident that an unbiased investigation will show that the actinolite asbestos is more pervasive and present in higher concentrations that Hanson wishes DEP to believe.

Hanson remains committed to continuing to work with the Department to allow the removal of the Cessation Order so that quarrying activities can resume at the Rock Hill Quarry.



**SENT VIA E-MAIL AND FIRST CLASS MAIL**

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October 29, 2021

Richard Tallman, P.E.

Pottsville District Mining Office  
Pennsylvania Department of Environmental Protection  
5 West Laurel Boulevard  
Pottsville, PA 17901

**Re: Elevated Review Technical Deficiencies Application No. 7974SM1C10  
Rock Hill Quarry  
East Rockhill Township, Bucks County  
Response to PADEP April 12, 2021 Technical Deficiency Letter**

Dear Mr. Tallman:

Hanson Aggregates Pennsylvania LLC (“Hanson”) provides this response to your letter dated April 12, 2021, requesting additional information in connection with Rock Hill Quarry (“Quarry”).<sup>1</sup>

By letter dated June 21, 2021, PADEP granted Hanson an extension through October 29, 2021, for Items 10.e. through 12.c. of the Technical Deficiency Letter (“TDL”) in recognition of the fact that these items require additional sampling and analysis. Hanson provided a timely response to Items 1 through 10.d of the Department’s TDL on July 6, 2021. Accordingly, Hanson now provides this timely response to the remaining Items 10.e. through 12.c. Hanson is also attaching to this response a memorandum by the R.J. Lee Group (“RJLG”) regarding its analysis of the single non-asbestiform structure (Attachment A) and a baseline assessment of risk posed by community exposure to background concentrations of asbestos at the Quarry perimeter (the “Risk Assessment”) (Attachment B).

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<sup>1</sup> Hanson is currently reviewing the Department’s October 21, 2021 Letter. This submission shall not be construed as a response to the Department’s October 21, 2021 Letter, and Hanson reserves the right to supplement or amend this submission, its prior submission, and related Asbestos Monitoring and Mitigation Plan and others plans in response to any issues raised or directives of the Department made therein. Hanson shall respond to the Department’s October 21, 2021 Letter in a full and timely fashion on or before the required response date of December 6, 2021.

Hanson conducted five (5) rounds of sampling at the eight (8) locations along the perimeter of the Quarry to characterize background levels of naturally occurring asbestos (“NOA”) at the Quarry. Hanson identified the eight locations in its July 6, 2021 submission. Of the forty (40) samples, Hanson identified only a single structure warranting additional analysis, which was subsequently determined not to possess asbestos morphology. Copies of the results of Hanson’s perimeter sampling and analysis are attached hereto as Attachment C.

As discussed in the Risk Assessment, the results of Hanson’s sampling in the air along the perimeter of the Quarry establish that no asbestos fibers were detected. These data provide a baseline against which any future detections of asbestos can be measured. The lack of background asbestos in the air at the Quarry perimeter indicates that further off-site analysis of asbestos, especially at locations outside the Quarry property, is unnecessary at this time. Because no asbestos fibers were detected in the air at the perimeter of the Quarry, any asbestos detected at locations outside the Quarry would be unrelated to Quarry operations.

### **Hanson Response to Comments from Rockhill Environmental Preservation Alliance (“REPA”) and Dr. Bradley Erskine.**

On October 4, 2021, the Rockhill Environmental Preservation Alliance, Inc. (“REPA”) and Dr. Bradley Erskine of Erskine Environmental Consulting, Inc. (“EEC”) submitted a response letter (the “EEC Response Letter”) to the Department following Hanson’s September 14, 2021, submission. Tellingly, REPA expressly stated that it “remains committed [sic] working with the Department to permanently cease operations at the Rock Hill Quarry.” REPA’s statement demonstrates its true intentions in this process. Apparently, REPA has absolutely no interest in credibly participating in this review. REPA’s comment also unfairly mischaracterizes the Department’s role, which is not to shut down the Quarry, but rather to make sure Hanson’s Quarry operations comply with Pennsylvania environmental statutes and the Department’s regulations.

#### **EEC Response 1:**

By associating REPA’s comments with EEC’s comments in the first sentence of the opening paragraph, and then commenting on REPA’s independent submittal in the second and third sentences, it may be misconstrued that EEC is not acting independently. EEC wishes to go on record that it is acting as a third-party reviewer, whose role is to provide non-partial technical reviews of Hanson, EMSL, EarthRes, and RJLG submittals.

The EEC Response Letter’s criticism of the counting methodology should be rejected. Hanson stands by its statement in its September 14, 2021 submission that “[a]ll fibers, regardless of length, are counted by Hanson at the perimeter air monitors, and that “[t]here will not be a scenario where the Department is unaware of the presence of NOA at the perimeter based on any ‘selective’ or ‘systematic’ counting scheme.”



## EEC Response 2:

The data provided by RJLG and their arguments regarding the “definition” of asbestos show that particles are removed based on subjective methodologies. The data and submittals to DEP show that Hanson/RJLG routinely excludes as asbestos particles that are deemed “non-asbestiform or “cleavage fragments”, even though there are no recognized test methods that can make this determination. DEP requested that RJLG provide a standard operating procedure that documents the procedures used, and RJLG responded that they do not have one. RJLG has not provided any testing procedures nor details by which they make this determination.

The reporting of particles as non-asbestos where they meet the criteria of asbestos as specified in test methods is a form of systematic under counting of asbestos, and in doing so, it can be concluded that DEP has and will be made unaware of the actual concentration of asbestos as normally reported by test methodologies. Additional information that forms the basis of this opinion is provided later in this response.

EEC’s criticism confuses the required counting methodology with RJLG analysis of particle morphology. In particular, EEC takes issue with RJLG’s analysis of the asbestiform morphology of the single structure identified across five rounds of sampling. As a result, EEC concludes that “[a]sbestos may be present will be unreported, as it was during the initial investigation. An exposure assessment cannot be accurately conducted with a compromised or biased data set.”

EEC’s conclusion is confusing. On one hand, EEC warns that asbestos will be unreported. On the other, EEC would not be able to perform its evaluation of RJLG’s analysis but for Hanson providing the final laboratory analysis reports for each of its five rounds of sampling and documentation as to the single structure identified, which, in addition to the final laboratory report, included a map identifying the location of the identified structure, electron micrograph imagery of the structure, an energy dispersive x-ray spectrum, and a selected area electron diffraction pattern, as well as a RJLG memorandum reviewing the data.

It is remarkable that EEC can review the data set provided by Hanson and then comment that asbestos will be unreported and that Hanson is not transparent. As indicated in its laboratory reports, RJLG counted all structure lengths that meet or exceed 0.5 um with a  $\geq 3:1$  aspect ratio and reported the total numbers of structures that met that length. There was only one such structure. RJLG’s subsequent analysis of the particle morphology of that structure has no impact on whether RJLG included that structure in its initial count – which it did. Hanson did not exclude the structure based upon its determination that it did not have the characteristics of asbestiform morphology.

EEC’s difference of opinion regarding RJLG’s analysis of the particle morphology of a single structure does not change the fact that RJLG *did* count the structure and, importantly, provided the data for the Department’s (and the public’s) review. This is how Hanson will continue to operate in the future. Hanson (or its consultant) will count all fibers that meet or exceed 0.5 micrometers at the perimeter of the Quarry and will provide the Department with all laboratory analysis in accordance with the requirements of Hanson’s Asbestos Monitoring and Mitigation Plan (“AMMP”). The Department will be



able to review whether any structures were identified. Based on these data, the Department may determine, on its own, whether Hanson appropriately counted structures and performed any appropriate corrective actions.

Contrary to EEC's critique, RLJG's qualitative analysis of the structure and conclusion that it does not have characteristics of asbestiform morphology *is* supported by the method used. EEC's criticism seems to be that RLJG did not provide enough detail regarding its qualitative assessment of the structure and determination that it did not possess the characteristics of asbestiform morphology and that the ISO 10312 method does not "specif[y] any additional criteria where a fiber can be deemed non-asbestos using general characteristics." This is patently wrong. First, RJLG did report the structure in accordance with the method as an amphibole structure. See [RJLG Final Laboratory Report, TEM ISO Analysis](#) (July 20, 2021).

### **EEC Response 3:**

Hanson/RJLG avoided the key point. RJLG appears to have followed the protocol by identifying the particle as a fiber, using electron diffraction to identify the fiber as an amphibole, and using EDX-analysis to determine the amphibole to be actinolite. The issue is that after the determination that the fiber was asbestos as specified as per the ISO 10312 test method, RJLG then applied additional criteria that are not provided in the test method, or any other test method, to excluded the fiber as asbestos using unspecified morphological characteristics. The ISO 10312 method has no procedure for applying these subjective criteria that allows for a removal of a fiber from the reporting as asbestos, and no other standardized test method does. The reporting of the fiber merely as an amphibole particle, and not including it in the asbestos column on the Final Report, resulted in both an under reporting and non-reporting of an asbestos fiber, and a conclusion that asbestos was not detected in the sample. It can be reasonably inferred that this practice of under reporting has occurred throughout the project for bulk, air and water samples.

Though ISO 10312 does not necessarily discriminate between asbestiform fibers and elongated/cleavage fragments of other non-asbestiform structures, ISO 10312 *does not* remove or prohibit the exercise of professional judgement from the process following the initial classification. This is implied throughout the method.

### **EEC Response 4:**

The purpose of a standardized test method is to standardize testing procedures to produce the same result across laboratories and analysts, and achieve precision, accuracy and reproducibility across laboratories and analysts. Regulatory or risk-based thresholds that test results are compared to are based on the requirement that laboratories follow the test methods explicitly.

It is remarkable that Hanson/RJLG would state, in writing to a regulatory agency, that they "exercise professional judgment... following the initial classification" to modify a result derived from a standardized test method, and state that the method does not "remove or prohibit the exercise" as a justification.

Would any chemical laboratory override a verified test result and report a lower

concentration of benzene in groundwater based on “professional judgment”? Would a material testing laboratory override a verified test result and report a higher relative compaction density of soil based on “professional judgement”? Would either laboratory justify the practice by arguing that the methods do not explicitly state that they cannot do so, and therefore, it is acceptable?

The overriding of a verified test result using “professional judgement” as practiced by Hanson/RJLG is not implied in any test method. It is required that the testing be conducted in strict conformance with the procedures that are explicitly outlined in the test methods, and concentrations are reported accordingly. Results are then compared to regulatory or safety thresholds.

ISO 10312 “Ambient Air – Determination of Asbestos Fibres – Direct Transfer Transmission Electron Microscopy Method” (hereinafter, “ISO 10312”) provides relevant definitions:

- **Asbestiform**: specific type of mineral fibrosity in which fibres and fibrils possess high tensile strength and flexibility.
- **Asbestos**: group of silicate minerals belonging to the serpentine and amphibole groups, which have crystallized in the asbestiform habit, causing them to be easily separated into long, thin, flexible, strong fibres when crushed or processed;
- **Cleavage**: breaking of a mineral along one of its crystallographic directions;
- **Cleavage Fragment**: fragment of a crystal that is bounded by cleavage faces:
  - **Note 1 to entry: crushing of non-asbestiform amphibole generally yields elongated fragments that conform to the definition of a fibre.**
- **Fibre**: elongated particle that has parallel or stepped sides
  - Note 1 to entry: For the purposes of this document, a fibre is defined to have an aspect ratio equal to or greater than 5:1 and a minimum length of 0.5  $\mu\text{m}$ .

See ISO 10312, Section 3 (Terms and Definitions), at p. 2-3 (emphasis added). Clearly, within its definition section, ISO 10312 expressly states that “non-asbestiform amphibole” can meet the definition of a fibre.

#### **EEC Response 5:**

Hanson/RJLG cites definitions as the justification for deviating from the procedures specified in ISO 10312, and applying these definitions to individual fibers as a basis to override a test result. Hanson/RJLG appears to cherry-pick elements of these definitions.

For example, Hanson/RJLG argues that a single fiber can be determined to be non-asbestiform based on the definitions. ISO 10312 defines asbestiform as:

*“specific type of mineral fibrosity in which fibres and fibrils possess high tensile strength and flexibility”.*

The determination of an asbestiform habit using this definition requires Hanson/RJLG to measure the “flexibility” of a fiber and the tensile strength of the fiber, and then compare the data to a recognized standard. This is not possible, and therefore, Hanson/RJLG

cannot use this definition to determine if a fiber is asbestos.

The definition of cleavage fragment is:

*“fragment of a crystal that is bounded by cleavage faces”* (note that this refers to the two planes of weakness along the (110) crystallographic plane in amphiboles).

Hanson/RJLG did not demonstrate that the fiber margins are the (110) crystallographic planes. This is not possible, and therefore, Hanson/RJLG cannot use this definition to determine if a fiber is a cleavage fragment.

The use of definitions to arrive at a determination can be easily manipulated to achieve a desired result. For example, the definition of acicular in ISO 10312 (not reproduced above) is:

*“The shape of an extremely slender crystal with cross sectional dimensions which are small relative to its length, i.e. needle-like”.*

Long fibrils of asbestos in building materials meet this definition. Therefore, if this definition was applied, asbestos fibers can be deemed to be acicular, and therefore, not asbestiform. It follows that the fibers could be removed from reporting as asbestos based on this definition. By Hanson/RJLG logic, this would be acceptable because the ISO 10312 method does not specifically prohibit it.

The examples provided above show that the general characteristics of asbestos as defined by ISO 10312 and virtually all asbestos test methods were not included as a part of the test method procedures. If this were the case, the ISO 10312 method (as well as other methods) would be invalidated because the definitions are general, vague, in many cases not correct, and in some cases, not measurable.

This concept of distinguishing between asbestiform and non-asbestiform is consistently reflected across the regulatory spectrum. As discussed by Hanson in its September 14, 2021 submission, OSHA removed non-asbestiform from its asbestos standards. See 55 Fed. Reg. 4938 (Feb. 12, 1990); 57 Fed. Reg. 24310 (June 8, 1992). Similarly, in EPA’s “Method for the Determination of Asbestos in Bulk Building Materials” (EPA/600/R-93/116), EPA states:

The major purpose of the quantitative preparation is to provide the analyst with a representative grain mount of the sample **in which the asbestos can be observed and distinguished from the nonasbestos matrix.**

See EPA/600/R-93/116, at p. 12 (emphasis added).

### **EEC Response 6:**

The term “matrix” does not refer to mineral morphology. It is well known, and quite fundamental, that the term “matrix” refers to a variety of materials comprising a building material that can mask the observance of target fibers. These include: fiberglass, gypsum, cellulose, calcite and other minerals, and mastics. Consider these passages from EPA/600/R-93/116:

*“Detection of possible asbestos fibers may be made more difficult by the presence of other nonasbestos fibrous components such as cellulose, fiber glass, etc., by binder/matrix materials which may mask or obscure fibrous components, and/or by exposure to conditions (acid environment, high temperature, etc.) capable of altering or transforming asbestos”.*

*“It may be appropriate to treat some materials by dissolution with hydrochloric acid to remove binder/matrix materials. Components such as calcite, gypsum, magnesite, etc., may be removed by this method”.*

Further clarity regarding the concept of matrix interferences is found in OSHA Reference Method 191, Polarized Light Microscopy of Asbestos. The method states:

*“In addition to the related mineral interferences, other minerals common in building material may present a problem for some microscopists: gypsum, anhydrite, brucite, quartz fibers, talc fibers or ribbons, wollastonite, perlite, attapulgite, etc. Other fibrous materials commonly present in workplaces are: fiberglass, mineral wool, ceramic wool, refractory ceramic fibers, kevlar, nomex, synthetic fibers, graphite or carbon fibers, cellulose (paper or wood) fibers, metal fibers, etc”.*

The terms “binder” and “matrix” do not refer to crystal morphology. The methods that are prescribed in the EPA test method are limited to treatment, primarily to ashing (removal of cellulose and mastics) and HCL-dissolution (removal of calcite and other soluble minerals). There are no references to asbestiform vs. cleavage fragments, and no methodology to remove cleavage fragments by treatment. Therefore, Hanson/RJLG’s assertion that non-asbestiform fibers are considered matrix material and may be eliminated (through professional judgment) is not factual.

Thus, contrary to EEC’s suggestion, laboratories are *required* to classify particles as asbestiform or non-asbestiform to meet applicable regulatory requirements. Consistent with its prior critique of Hanson’s analysis, EEC’s theme seems to be that Hanson and its consultants should not be permitted to exercise any professional judgment. This is not possible. In any event, Hanson personnel are well trained and more than capable of implementing Hanson’s corrective action scheme to the satisfaction of the Department.

### **EEC Response 7:**

Asbestos laboratories are not *required* to classify particles as asbestiform or non-asbestiform, and this assertion is absurd. In fact, laboratories are required to report fibers as asbestos as specified by test methods, regardless of morphology, and no test

method provides procedures to do so. Consider, if laboratories are *required* to do so, then:

- Why are there no test methods to distinguish the two morphologies?
- Why does NIST not require an SOP for differential protocols as part of the NVLAP accreditation?
- Why does NIST not provide to laboratories proficiency testing samples with mixed morphologies, and an instruction to distinguish the two morphologies?
- Why do the overwhelming majority of laboratories, perhaps all but RJLG and perhaps EMSL, include all fibers in the asbestos count?
- If differential counting is *required*, as RJLG maintains, are not the millions of building material test results by hundreds of laboratories performed since the late 1980's invalid results?

October 29, 2021

Mr. Robert Schena  
Fox Rothschild, LLP  
747 Constitution Dr  
Suite 100  
Exton, PA 19341

RE: Hanson Aggregates Rock Hill Quarry  
RJ Lee Group Project Number LLH901997

Dear Mr. Schena,

This letter is to present a technical response to the letter dated September 28, 2021 from Erskine Environmental Consulting (EEC) to REPA. The EEC letter contains several statements as to the nature of the testing and results provided by RJ Lee Group.

### **REPA criticism #1**

Hanson submitted a number of test results where asbestos was detected in one sample during a time frame when activity at the site was minimal or absent. The test results and interpretations were provided by their consulting laboratory, R.J. Lee Group (RJLG). For the sample where an actinolite fiber was observed, RJLG, within the body of the text, classified the fiber as not having the characteristics of asbestos, and included a TEM photograph and EDX chemical spectra in support of this assertion. The final laboratory report omitted reference to the determination that the fiber was actinolite, a regulated form of asbestos.

A particle of actinolite was observed during the analysis and was accurately and completely reported. Contrary to EEC's assertion, the observed actinolite fiber was reported, but was correctly classified as having a non-asbestiform habit.

The definition of asbestos, from ISO 10312-2019 is:

#### **3.6 asbestos**

group of silicate minerals belonging to the serpentine and *amphibole* (3.2) groups, which have crystallized in the asbestiform habit, causing them to be easily separated into long, thin, flexible, strong fibres (3.22) when crushed or processed

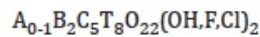
Note 1 to entry: The Chemical Abstracts Service Registry Numbers of the most common asbestos varieties are: chrysotile (12001-29-5), crocidolite (12001-28-4), grunerite asbestos (Amosite) (12172-73-5), anthophyllite asbestos (77536-67-5), tremolite asbestos (77536-68-6) and actinolite asbestos (77536-66-4). Other varieties of asbestiform amphibole, such as richterite asbestos and winchite asbestos<sup>[19]</sup> may also be found in some products such as vermiculite and talc.

This is expanded by the definition of amphibole:

### 3.2

#### **amphibole**

group of rock-forming ferromagnesium silicate minerals, closely related in crystal form and composition, and having the nominal formula:



where

A = K, Na;

B = Fe<sup>2+</sup>, Mn, Mg, Ca, Na;

C = Al, Cr, Ti, Fe<sup>3+</sup>, Mg, Fe<sup>2+</sup>;

T = Si, Al, Cr, Fe<sup>3+</sup>, Ti.

Further, the definition for amphibole asbestos:

### 3.3

#### **amphibole asbestos**

*amphibole* (3.2) in an *asbestiform* (3.5) habit

For completeness, the definition of asbestiform:

### 3.5

#### **asbestiform**

specific type of mineral fibrosity in which the *fibres* (3.22) and fibrils possess high tensile strength and flexibility

And fibre:

### 3.22

#### **fibre**

elongated particle that has parallel or stepped sides

Note 1 to entry: For the purposes of this document, a fibre is defined to have an aspect ratio equal to or greater than 5:1 and a minimum length of 0,5 µm.

Note: this definition has been modified per USEPA OSWER Directive 9200.0-68 as specified by PADEP to include particles with aspect ratio equal to or greater than 3:1.

A further clarifying definition is also provided in the method:

### 3.13

#### **cleavage fragment**

fragment of a crystal that is bounded by *cleavage* (3.12) faces

Note 1 to entry: Crushing of non-asbestiform amphibole generally yields elongated fragments that conform to the definition of a fibre.

In the above definition for cleavage fragment, it is important to note that elongated non-asbestiform fragments can conform to the definition of a fiber, and would be included in the overall structure count. However, ISO's specific definition for "cleavage fragment" clearly acknowledges that not all elongated fibers can or should be considered to be asbestos. This is critical in that the known facts are the rocks at Rock Hill have indicated the presence of both asbestiform (and thus amphibole asbestos) and non-



asbestiform amphiboles (not amphibole asbestos). Thus, it is improper to presume all amphibole fibers would be asbestos, as not all of the fibers can be assumed to be asbestiform. The importance of this fact has been codified by USOSHA in 1992<sup>1</sup> to exclude non-asbestiform varieties of the amphibole minerals from the regulation of asbestos. Further, USMSHA came to a similar conclusion in 2008<sup>2</sup> and did not include non-asbestiform amphiboles in the definition of asbestos.

### **EEC Response 1:**

RJLG claims to have applied a differential counting protocol to the fiber in question to correctly classify the fiber as having the non-asbestiform habit. DEP requested RJLG's operating procedure that is used by their analysts to make this determination, and RJLG stated that they do not have one, and use professional judgement. RJLG has not refuted the fact that there are no recognized test methods that can differentiate between an asbestiform fiber and cleavage fragment. What criteria is RJLG using to apply "professional judgment" and selectively remove the fiber from reporting as asbestos as is required by the ISO 10312 test method? What data is RJLG collecting as a basis to apply professional judgment?

RJLG refers to the definitions, reproduced above from ISO 10312, used to make this determination. If so, it is instructive to review the definitions to see how they can be applied to a fiber imaged on a TEM micrograph to unequivocally determine if it crystallized in the asbestiform habit or is a cleavage fragment:

Cleavage fragment. The definition of a cleavage fragment in ISO 10312 is: "*fragment of a crystal that is bounded by cleavage faces*".

In this case, a cleavage face is a surface that cleaved along the amphibole (110) crystallographic planes, and there are two planes intersecting at angles of 56 and 124 degrees. Characterizing the fiber using this definition requires documentation that the sides of the fiber are defined by the (110) crystallographic plane, and this is not possible using standard TEM methodology. Therefore, RJLG cannot conclude that the fiber is a cleavage fragment using this definition.

Asbestiform. The definition of asbestiform in ISO 10312 is "*specific type of mineral fibrosity which the fibres or fibrils possess high tensile strength and flexibility*".

Characterizing the fiber as asbestiform using this definition requires a test of flexibility and tensile strength, which is not possible. Also, there are no criteria that a measurement may be compared to determine if the flexibility is high or low relative to the non-asbestiform analogue. Therefore, RJLG cannot conclude that the fiber did not crystallize in the asbestiform habit using this definition.

RJLG also refers to the exclusion of non-asbestiform minerals (as codified in 57 Code of Federal Regulations 24310, June 8, 1992) as a basis to apply non-standardized techniques as a supplement to ISO 10312. This is wholly inappropriate- a laboratory should use the test methods that were developed to implement the regulation. Following promulgation of the regulation, OSHA prepared a standard for asbestos-related work and developed a test method to quantify asbestos in air samples (OSHA Reference Method ID-160 by PCM). Nearly all standardized methods are designed using a similar framework: The scope, applicability and constraints of the method describe the target constituent that is the subject of the test method, followed by the testing protocol designed to quantify that target constituent. The OSHA method defines the target constituent as asbestos, and provides



definitions that describe fibers that crystallized in the asbestiform habit. The method includes all fibers (including fiberglass and gypsum) in the count, and states that it does not differentiate between asbestos and non-asbestos fibers. OSHA also produced a test method for bulk materials designed to identify asbestos as specified in the definitions section of the method. In both cases, no procedures were specified to differentiate between the two habits. It is unlikely that OSHA would produce two standardized test methods designed to test for the target constituent (asbestos) as defined in the methods, and then admit that they do not adequately report asbestos as intended.

The OSHA ID-160 method was refined by two ASTM methods that addressed the asbestos-non-asbestos differentiation problem, and these methods are the method of choice to apply to worker protection standards. NIOSH M7400 by PCM is comparable to OSHA ID-160, and does not differentiate between asbestos and non-asbestos minerals. NIOSH M7402 by TEM solves the problem by applying diffraction and chemical analysis to remove non-asbestos fibers from the reporting. It removes only fibers that are not chrysotile or one of the five regulated amphibole compositions, and like all other asbestos methods, do not specify procedures to differentiate on the basis of crystallization morphology. Thus, there are no criteria specified in the OSHA methods, or any other method, that allow RJLG to conclude that the fiber in question is not asbestos.

#### ABSTRACT

This report by the Federal Bureau of Mines Particulate Mineralogy Unit recommends mineralogical definitions and identification-characterization concepts for selected silicate minerals and their asbestiform varieties. Precise definitions acceptable to mineral analysts, regulatory personnel, and medical scientists are essential because of the present lack of conformity in terminology concerned with measuring and controlling asbestiform particulates and their related health effects. Because of the complexity and variability of crystal morphology in different mineral groups, the descriptive terms are generally explained by illustration rather than by numerical values. Applications and limitations of several analytical techniques for particulate identification and characterization are discussed.

#### REPA criticism #2

The fiber in question, does, in fact, possess the characteristics of asbestos as defined by the procedures of the test method, and the method includes no criteria allowing the classification of a fiber as non-asbestos using general descriptive criteria. ISO 10312 defines a fiber as:

*Any particle with parallel or stepped sides, of minimum length 0.5  $\mu$ m, and with an aspect ratio of 5:1 or greater, shall be defined as a fiber.*

The fiber in question meets this definition.

Here EEC mixes definitions. It is clear that EEC is using only the definition of "fiber" as provided in ISO 10312 to mean "asbestos". EEC believes that any and all amphibole fibers be counted as asbestos even if they are not. RJLG clearly reported the fiber as amphibole and did nothing to exclude it from the analysis or hide it from critical review. Reporting the fiber as non-asbestiform is consistent with the facts presented by observation of the fiber and comparison to characteristics of asbestiform material presented in peer-reviewed literature cited in ISO 10312 (Campbell W.J, Blake R.L., Brown L.L., Cather E.E., Sjoberg J.J. Selected silicate minerals and their asbestiform varieties. Mineralogical definitions and identification-characterization. Information circular 8751. United States Department of the Interior,

### **EEC Response 2:**

Contrary to RJLG's claim, it is RJLG that has consistently mixed definitions by selectively choosing definitions from one method and applying it to another. RJLG, above, cited definitions in the final rules promulgated by the U.S. Department of Labor. EEC has consistently stated that the definition of asbestos is that which is reported by the individual test methods, and that a laboratory must report asbestos concentrations as specified in the procedures. Modification of a method that will report asbestos concentrations lower than those reported by adherence to the test methods, using selective references to peer-reviewed literature, is not standard nor acceptable. If the ISO intended to differentiate between the two morphologies and exclude certain particles, the method would have included procedures for doing so. Asbestos as defined in the ISO 10312 method is the concentration that is reported by adherence to the method, and not that modified by other subjective criteria.

### **REPA criticism #3**

**The RJLG report (dated July 30, 2021) identified the fiber as actinolite, an amphibole regulated as asbestos.**

Actinolite is regulated as asbestos only when it occurs in the asbestiform habit. RJLG is following current US regulations on the nature of what is and is not asbestos.

It is not clear why RJLG did not report the fiber as asbestos when, by their own report, meets the criteria specified in ISO 10312:

1. The particle meets the definition of a fiber,
2. The particle was identified as an amphibole, and
3. The amphibole was identified as actinolite.

Thus, the fiber should have been reported on the report as actinolite asbestos, and not non-asbestiform amphibole.

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<sup>1</sup> 57 FR 24310, June 8, 1992

<sup>2</sup> 73 FR 11284, February 29, 2008

RJLG did not report the fiber as asbestos because it does not possess the characteristics of being asbestiform. The fiber in question does in fact meet all of the three criteria listed, and was accurately reported as an amphibole fiber. RJLG will only report as asbestos those fibers that possess asbestiform characteristics. We have been clear and transparent in presenting this finding.

The ISO 10312 method acknowledges the interference that non-asbestiform fibers (i.e. cleavage fragments) present. However, it in no way requires that all amphibole fibers be reported as asbestos. At Appendix D, Section D.4.1:

It is not always possible to proceed to a definitive identification of a fibre; this may be due to instrumental limitations or to the actual nature of the fibre.

This statement acknowledges the inherent interferences using the ISO10312 method by fibers of non-asbestiform morphology (i.e. actual nature of the fibre).

Also at Appendix D, Section D.4.3:

Every particle without tubular morphology and which is not obviously of biological origin, with an aspect ratio of 5:1 or greater, and having parallel or stepped sides, shall be considered as a suspected amphibole fibre.

This phrasing clearly describes the fiber at issue. RJLG followed the appropriate steps of zone axis ED and quantitative EDS analysis to arrive at the correct identification of the fiber being of unequivocal amphibole composition as outlined in Figure D.4 and identified the fiber as amphibole.

All particles observed to have the morphology of a fiber have been counted. This fiber has also been accurately identified as being amphibole. RJLG has not evaded any portion of the ISO 10312 method.

The continued criticism by REPA and its consultant on the RJLG results is refuted by the method itself. The argument hinges on this single sentence in the Scope section of ISO 10312:

The method cannot discriminate between individual fibres of asbestos and elongate fragments (cleavage fragments and acicular particles) from non-asbestos analogues of the same amphibole mineral<sup>[13]</sup>.

This statement is at odds with the entire foundation of the EEC criticisms of the results provided by RJLG and is ignored by REPA. By their reasoning all observed fibers of amphibole should be asbestos. Since the counting criteria cannot differentiate between the two forms, and we know that the two forms exist at this site, it cannot be used to differentiate one form from the other. By utilizing and continually misinterpreting this method it is clear that one of the aims of REPA through their consultant is to consistently inflate (in this instance by 100%) the concentration of any "asbestos" that might be measured. By equating the definition of "fiber" to mean "asbestos" REPA is ignoring the facts of the geology at this site as has been consistently done in repeated reviews of RJLG analyses. RJLG does not deny that an amphibole fiber was found during the analysis (we reported it). By referring to the publication cited at 13 in the bibliography of ISO 10312 it is possible to understand the differences in the nature of asbestos and non-asbestos varieties of amphibole. While there is no quantitative means to make this distinction for a single fiber, that does not preclude making the best effort to accurately

describe the nature of the material being examined. When dealing with non-commercial amphibole types (e.g., actinolite), if the dimensions and characteristics of the observed fiber were consistent with amphibole asbestos it would have been reported as such. Additionally, ISO 22262-1 describes a means of differentiating asbestiform amphiboles states:

In general, for this part of ISO 22262, the presence of either the asbestiform or the non-asbestiform analogues of tremolite, actinolite, anthophyllite or richterite/winchite can usually be specified. If the majority of the amphibole fibres longer than 5 µm have aspect ratios equal to or lower than 5:1, and if the fibres do not exhibit any of the characteristics in c), it can be concluded that the amphibole is probably non-asbestiform, with the degree of certainty increasing with decreasing maximum aspect ratio. If any amphibole fibres longer than 5 µm with aspect ratios in the range of 20:1 or higher are observed, then it can be concluded that amphibole asbestos is probably present, with the degree of certainty increasing with increasing aspect ratio.

### EEC Response 3:

The intent and the limitation of the ISO 10312 method is clearly identified in the abstract:

“This document specifies a reference method using transmission electron microscopy for the determination of airborne asbestos fibres and structures in a wide range of ambient air situations, including the interior atmospheres of buildings, and for a detailed evaluation for asbestos structures in any atmosphere. The method allows determination of the type(s) of asbestos fibres present and also includes measurement of the lengths, widths and aspect ratios of the asbestos structures. **The method cannot discriminate between individual fibres of asbestos and elongate fragments (cleavage fragments and acicular particles) from non-asbestos analogues of the same amphibole mineral**” (emphasis added by EEC).

ISO 10312 cannot have made it any clearer. By removing the fiber in question from the reporting as non-asbestos, RJLG has shown that they are not providing asbestos concentrations in conformance with the test method. The same is true for the previous results reported for rock, water and air samples where RJLG claimed to adhere to other test methods.

RJLG states: “RJLG will only report as asbestos those fibers that possess asbestiform characteristics”, but still have not directly provided any criteria that was used to demote the asbestos fiber from asbestos to merely a particle of amphibole. RJLG points to definitions and selected passages in ISO 10312 as the means for eliminating fibers. One such passage is reproduced below:

In general, for this part of ISO 22262, the presence of either the asbestiform or the non-asbestiform analogues of tremolite, actinolite, anthophyllite or richterite/winchite can usually be specified. If the majority of the amphibole fibres longer than 5 µm have aspect ratios equal to or lower than 5:1, and if the fibres do not exhibit any of the characteristics in c), it can be concluded that the amphibole is probably non-asbestiform, with the degree of certainty increasing with decreasing maximum aspect ratio. If any amphibole fibres longer than 5 µm with aspect ratios in the range of 20:1 or higher are observed, then it can be concluded that amphibole asbestos is probably present, with the degree of certainty increasing with increasing aspect ratio.

The passage refers to a population of fibers, and not the characteristics of an individual fiber. RJLG has acknowledged that EPA method 600 states that the general characteristics of asbestos apply to a population of fibers, and EPA test method 100.1 (the only test method that addresses particle differentiation) defines a population as at least 50 fibers. One fiber is hardly a population.

Regardless, based on the passage in ISO 10312, RJLG must count all fibers as asbestos. The passage that RJLG cited states that if, in a population, “any fibers longer than 5µm and

have aspect ratios of 20:1, it can be concluded that amphibole asbestos is present". RJLG has concurred that asbestos is present in the diabase rock, and therefore, the entire population of actinolite must be reported as asbestos. RJLG feels that it is appropriate to eliminate fibers that have been shortened through pulverization during drilling, blasting, and excavation, on a fiber-by-fiber basis. This apparently has been the procedure that they have used to under report or not report asbestos in samples from the beginning of the project, and apparently will be the procedures that will be followed in the future. This subjective characterization method is not only inappropriate, it is dangerous considering that the target particle is a listed carcinogen.

#### **REPA criticism #4**

Finally, EEC continues to make the same criticism of RJLG:

This subject has been addressed in several memoranda by EEC, and it is a very important issue in evaluating whether or not the project should be allowed to move forward. If the RJLG reports are an indication of what may be expected in the future, then it seems asbestos in processed material and air samples will be reported as non-asbestos based on "characteristics of asbestiform morphology" rather than as reported by the test methodology. Asbestos that may be present will be unreported, as it was during the initial investigation. An exposure assessment cannot be accurately conducted with a compromised or biased data set.

Reporting on this site over the past two years by RJLG has been consistent with the prescribed generally accepted methods: the amphibole present in the quarry is actinolite and represents a range of morphologies from asbestiform to prismatic. When asbestiform actinolite has been observed, it has been accurately reported as actinolite asbestos. Likewise, when non-asbestiform actinolite has been observed, it has been accurately reported as such following generally accepted analytical methodologies. No serpentine or amphibole type fibers have been excluded from the analyses and RJLG will continue to accurately follow the counting protocols of any prescribed methods. The fact that amphibole occurs in a range of morphologies confounds any interpretation of the data collected on the nature of any airborne fibers by any laboratory that thoroughly understands the issues at hand (refer to EMSL letter to PADEP dated October 30, 2019). Just because the prescribed analytical method does not provide a quantitative means to distinguish asbestiform from non-asbestiform fibers does not abolish the fact that they may exist together in a sample and in this quarry.

For the purpose of regulating this site, the distinction between asbestiform and non-asbestiform materials is crucial. For the purpose of monitoring the concentration of airborne fibers to assess any hazard presented, that distinction is also crucial.

If PADEP personnel have any concerns over the scientific credentials and integrity of the RJ Lee Group's laboratory and staff based on the continued assertions of REPA and their paid contractor(s), we welcome PADEP to visit our laboratory and speak with our personnel. It should be noted that RJLG is a PADEP approved laboratory for asbestos analysis.

#### **EEC Response 4:**

In support of their position, RJLG cites EMSL as a "laboratory that thoroughly understands the issues at hand", and asks EEC to refer to October 30, 2019 comments by this presumably expert laboratory. The specific passages that may support their position were not identified.

DEP may recall that it requested RJLG and EMSL to provide their standard operating procedures



that provide the basis of asbestos differentiation. RJLG declined, stating that they did not have one. EMSL also declined. In their January 8, 2020 response, EMSL stated:

*“Unfortunately the distinction between asbestiform and non-asbestiform on a fiber by fiber basis is difficult at best and is often based on subjective morphological observations. Even the importance of the distinction between asbestiform and other fibers with similar dimensions is subjective and highly debated”.*

The testimony by RJLG’s referenced expert laboratory is clear and refutes RJLG’s contention: the methodology to make a distinction is based on subjective observations, and the importance of differentiating between the two is debated. The term “importance” refers to the potential difference in toxicity.

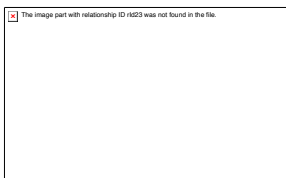
RJLG also states:

*“Just because the prescribed analytical method does not provide a quantitative means to distinguish asbestiform from non-asbestiform fibers does not abolish the fact that they may exist together in a sample and in this quarry”.*

That there may be mixed morphologies in rocks is not disputed; in fact, this is likely the rule and not the exception. Even fibrous minerals that were mined and applied in building materials is composed of a mixture, and all fibers are counted as asbestos by applicable test methods. RJLG has been arguing for months that they are following procedures prescribed in test methods, but their statements indicate that this has not been the case.

RJLG strives for accuracy in all analyses performed, and to over-report the asbestos content measured by deviation from standard methods is inaccurate and unacceptable. How the PADEP or our client Hanson uses or interprets our data is beyond our control.

Sincerely,



Bryan Bandli, Ph.D.  
Principal Investigator