



Sent via e-mail

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November 25, 2019

Gary A. Latsha
District Mining Manager
Pottsville District Mining Office
Pennsylvania Department of Environmental Protection
5 West Laurel Boulevard
Pottsville, PA 17901

**Re: Transmittal of RJ Lee Group November 25, 2019 Letter
Rock Hill Quarry
Hanson Aggregates Pennsylvania LLC
SMP # 7974SM1
East Rockhill Twp., Bucks Co., PA**

Mr. Latsha:

Hanson Aggregates Pennsylvania LLC (Hanson) is providing the attached November 25, 2019 letter from RJ Lee Group regarding the Rock Hill Quarry and applicable regulations.

Please feel free to contact me at (610) 366-4819 should you wish to discuss this submission or have any questions regarding the enclosed information.

Regards,

A handwritten signature in blue ink, appearing to read "AJG", with a long horizontal flourish extending to the right.

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

encl: RJ Lee Group letter to Andrew J. Gutshall, P.G. dated November 25, 2019

cc: John Stefanko, PADEP
Daniel Sammarco, P.E., PADEP
Michael P. Kutney, P.G., PADEP
Amiee Bollinger, PADEP
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David Raphael, Esq., K&L Gates
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Drew Van Orden, P.E., RJ Lee Group
Louis F. Vittorio, P.G., EarthRes
Robert Gundlach, Esq., Fox Rothschild
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Michael C. Lewis, CHMM, Hanson
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November 25, 2019

Mr. Andrew J. Gutshall
Hanson Aggregates Pennsylvania LLC
7660 Imperial Way
Allentown, PA 18195-1040

RE: Regulations of Asbestos Minerals
RJ Lee Group Project Number: LLH901997

Mr. Gutshall,

Based on comments contained in a letter from the East Rockhill Township Board of Supervisors (dated October 30, 2019), there appears to be continuing confusion about what minerals are or are not regulated as “asbestos”. Only six minerals which occur in the asbestiform growth habit are regulated as “asbestos”. In addition, the analytical procedures require that asbestos fibers be differentiated from non-asbestos particles.

Definition of Asbestos

The Federal government regulated six minerals (one serpentine and five amphibole minerals) as asbestos when they occur in the asbestiform habit. The minerals are listed in Table 1 which is taken from a recommended US Environmental Protection Agency (EPA) analytical protocol (EPA 600/R-93/116):

Table 1. The asbestos minerals and their nonasbestiform analogues

Asbestiform	Nonasbestiform	Chemical Abstract Service No.
Serpentine Chrysotile	Antigorite, lizardite	12001-29-5
Amphibole Anthophyllite asbestos	Anthophyllite	77536-67-5
Cummingtonite-grunerite asbestos (Amosite)	Cummingtonite-grunerite	12172-73-5
Crocidolite	Crocidolite	12001-28-4
Tremolite asbestos	Tremolite	77536-68-6
Actinolite asbestos	Actinolite	77536-66-4

Reproduced from Table 2-6 of EPA 600-R-93/116

As suggested by the above Table, these minerals occur in a variety of growth habits, broadly classed as “asbestiform” and “nonasbestiform”. The vast majority of any of these minerals occur as non-asbestos particles (nonasbestiform) and are common rock-forming minerals worldwide.

Asbestos Regulations

The asbestiform varieties of these six minerals are regulated by various agencies of the Federal government. EPA regulates asbestos under several laws, but as it applies to the Rock Hill Quarry, the regulations from the *National Emission Standard for Hazardous Pollutants* (NESHAP, found at 40 CFR §61 Subpart M—National Emission Standard for Asbestos, beginning with §61.140) and under the *Toxic Substances Control Act* (TSCA, found at 40 CFR §763 – Asbestos, beginning with §763.80) are applicable. Other EPA regulations, specifically those related to Superfund, are not applicable. Various definitions are provided in these regulations, Table 2:

Table 2. US Environmental Protection Agency Definitions of Asbestos

Regulation	Definition
NESHAP 40 CFR §61.141	<i>Asbestos</i> means the asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite. <i>Regulated asbestos-containing material (RACM)</i> means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by this subpart.
TSCA 40 CFR §763.83	<i>Asbestos</i> means the asbestiform varieties of: Chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonite-grunerite); anthophyllite; tremolite; and actinolite. <i>Asbestos-containing material (ACM)</i> when referring to school buildings means any material or product which contains more than 1 percent asbestos.

The EPA defined asbestos as the “asbestiform varieties of ...” but provided no definition of “asbestiform”. Both regulations require that samples be analyzed in accordance with the method found at 40 CFR §763 Appendix E to Subpart E of Part 763—*Interim Method of the Determination of Asbestos in Bulk Insulation Samples*. This method describes the analysis of samples using polarized light microscopy (PLM) and x-ray powder diffraction (XRD). The promulgated analytical method does not define “asbestiform” but does include a reference to a publication by Campbell, et al.¹ which does define this term.

The US Occupational Safety and Health Administration (OSHA) also regulates asbestos under several different sections (see 29 CFR §1910.1001, 29 CFR §1915.1001, and 29 CFR §1926.1101) all using similar limits and definitions. Table 3 shows these definitions:

¹ W. J. Campbell, R. L. Blake, L. L. Brown, E. E. Cather, and J. J. Sjoberg (1977). *Selected Silicate Minerals and Their Asbestiform Varieties: Mineralogical Definitions and Identification – Characterization*, U.S. Bureau of Mines Information Circular 8751.

Table 3. US Occupational Safety and Health Administration Definitions of Asbestos

Regulation	Definition
29 CFR §1910.1001	<i>Asbestos</i> includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered. <i>Asbestos-containing material (ACM)</i> means any material containing more than 1% asbestos.
29 CFR §1915.1001	<i>Asbestos</i> includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that has been chemically treated and/or altered. <i>Asbestos-containing material, (ACM)</i> means any material containing more than one percent asbestos.
29 CFR §1926.1101	<i>Asbestos</i> includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that has been chemically treated and/or altered. <i>Asbestos-containing material (ACM)</i> , means any material containing more than one percent asbestos.

OSHA specifically regulates the asbestiform varieties of these minerals as described in the preamble to the 1992 regulations.² As publication on OSHA regulations (excluding the 1992 ruling) describes the various steps OSHA took to regulate asbestos fibers.³

The Mine Safety and Health Administration (MSHA) also regulates asbestos exposure to workers (see 30 CFR §56.5001). MSHA also defines asbestos in a manner similar to OSHA, Table 4:

Table 4. US Mine Safety and Health Administration Definitions of Asbestos

Regulation	Definition
Surface Mines 30 CFR §56.5001	Asbestos is a generic term for a number of asbestiform hydrated silicates that, when crushed or processed, separate into flexible fibers made up of fibrils. <i>Asbestos</i> means chrysotile, cummingtonite-grunerite asbestos (amosite), crocidolite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos.
Underground Mines 30 CFR §57.5001	Asbestos is a generic term for a number of asbestiform hydrated silicates that, when crushed or processed, separate into flexible fibers made up of fibrils. <i>Asbestos</i> means chrysotile, cummingtonite-grunerite asbestos (amosite), crocidolite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos.

² OSHA (1992). "Occupational Exposure to Asbestos, Tremolite, Anthophyllite and Actinolite; Final Rule, Part II", *Federal Register*, 57, p. 24310-24331, June 8, 1992.

³ J. Martonik, E. Nash, and E. Grossman (2001). "The History of OSHA's Asbestos Rulemakings and Some Distinctive Approaches that They Introduced for Regulating Occupational Exposure to Toxic Substances", *American Industrial Hygiene Association Journal*, 62, p. 208-217.

All three agencies (EPA, OSHA, and MSHA) regulate the asbestos fibers, describing them as either “asbestos” or “asbestiform”. OSHA discussed the literature related to non-asbestos amphiboles in 1992 and concluded that they would not be regulated as if they were asbestos fibers. OSHA further states: “Asbestos and nonasbestiform ATA appear to be distinguishable mineral entities on a population basis, and in most instances on a particle basis.” OSHA goes on further to state: “The characteristics which differentiate them generally appear to correspond to the properties which may dictate different biologic response.” Finally, OSHA concluded: “Therefore, OSHA finds there is insufficient evidence to support regulating nonasbestiform ATA [actinolite, tremolite and anthophyllite] as presenting a risk similar in kind and extent to asbestos.”

Both EPA and OSHA cite to the work by Campbell, et al¹ to describe what is and what is not asbestos. Portions of Campbell are included (copied) in the appendices to OSHA’s regulations. Campbell defines asbestos as follows:

Asbestos.--(1) A collective mineralogical term encompassing the asbestiform varieties of various minerals; (2) an industrial product obtained by mining and processing primarily asbestiform minerals.

They further define asbestiform as:

Asbestiform.--A specific type of mineral fibrosity in which the fibers and fibrils possess high tensile strength and flexibility. The definition of asbestiform minerals includes three aspects: morphology, structure, and chemistry. Morphologically, asbestiform mineral varieties separate into flexible fibers or flexible bundles of fibers.

In 1994, the EPA issued a notice (*Federal Register*, 59, p. 38970-38971) to the analytical community that there was an improved, but not promulgated, PLM analytical method (EPA 600/R-93/116) and recommended its usage. Contained in that method is a definition of “asbestiform”:

“Asbestiform (morphology) - Said of a mineral that is like asbestos, i.e., crystallized with the habit of asbestos. Some asbestiform minerals may lack the properties which make asbestos commercially valuable, such as long fiber length and high tensile strength. With the light microscope, the asbestiform habit is generally recognized by the following characteristics:

- Mean aspect ratios ranging from 20: 1 to 100: 1 or higher for fibers longer than 5µm. Aspect ratios should be determined for fibers, not bundles.
- Very thin fibrils, usually less than 0.5 micrometers in width, and
- Two or more of the following:
 - Parallel fibers occurring in bundles,
 - Fiber bundles displaying splayed ends,
 - Matted masses of individual fibers, and/or
 - Fibers showing curvature

These characteristics refer to the population of fibers as observed in a bulk sample. It is not unusual to observe occasional particles having aspect ratios of 10:1 or less, but it is unlikely that the asbestos component should be dominated by particles (individual

fibers) having aspect ratios of <20:1 for fibers longer than 5µm. If a sample contains a fibrous component of which most of the fibers have aspect ratios of <20:1 and that do not display the additional asbestiform characteristics, by definition the component should not be considered asbestos.”

Asbestos Analytical Methods

Both OSHA and EPA have published methods that are to be used to analyze samples for possible asbestos content. Some of these are promulgated (such as EPA: 40 CFR §763 Appendix E to Subpart E; and OSHA: 29 CFR §1910.1001 Appendix J) while others have been recommended (see EPA 600/R-93/116). Written to support the regulation of asbestos, these methods contain procedures that can be used to differentiate asbestos fibers from non-asbestos particles.

EPA’s recommended procedure contains a detailed description of “asbestiform” (see above) which provides information on when to count and when not to count a particle as “asbestos”. EPA’s promulgated method suggests that – “Fibrous organic and inorganic constituents of bulk samples may interfere with the identification and quantitation of the asbestos mineral content.” This method also indicates that: “the presence of nonasbestiform serpentines and amphiboles in a sample will pose severe interference problems in the identification and quantitative analysis of their asbestiform analogs”.

OSHA indicates that the non-asbestos mineral particles are interferences when analyzing a sample for possible asbestos content (29 CFR §1910.1001 Appendix J). Their PLM states: “The minerals present can exist in asbestiform, fibrous, prismatic, or massive varieties all at the same time.” OSHA discusses the characteristics of the non-asbestos amphibole particles:

Most cleavage fragments of the asbestos minerals are easily distinguishable from true asbestos fibers. This is because true cleavage fragments usually have larger diameters than 1 µm. Internal structure of particles larger than this usually shows them to have no internal fibrillar structure. In addition, cleavage fragments of the monoclinic amphiboles show inclined extinction under crossed polars with no compensator. Asbestos fibers usually show extinction at zero degrees or ambiguous extinction if any at all. Morphologically, the larger cleavage fragments are obvious by their blunt or stepped ends showing prismatic habit. Also, they tend to be acicular rather than filiform.

As noted above, there are various regulations that do apply to different aspects of the Rock Hill Quarry, including EPA (NESHAP and TSCA), OSHA, and MSHA. There are other applicable Federal regulations (specifically the EPA Superfund regulations) that address issues related to “asbestos”, but according to information available on the EPA Superfund website (<https://www.epa.gov/superfund/search-superfund-sites-where-you-live>) the Rock Hill Quarry is not a National Priority List (NPL) site – therefore these additional Federal regulations are not applicable to this site. The applicable Federal regulations and analytical methods are written such that only mineral fibers that grew in the asbestiform habit are considered to be “asbestos” and regulated as such. It is imperative to the analytical laboratory that this distinction be applied to the particles when samples are being analyzed.

If you have any questions concerning these issues, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Drew R. Van Orden". The signature is written in a cursive style with a large, stylized initial 'D'.

Drew R. Van Orden, PE
Senior Consulting Scientist