Miller, Diane M. (CDC/NIOSH/EID)

From: Mark Ellis [markellis@ima-na.org]
Sent: Monday, November 03, 2008 9:05 AM
To: Miller, Diane M. (CDC/NIOSH/EID)
Cc: markellis@ima-na.org
Subject: FW: 099-A NIOSH Revised CIB Roadmap
Importance: High
Attachments: NIOSH Revised Roadmap - Comments.doc; NIOSH Roadmap - Comments.doc

Ms. Miller--

Per our discussion. Please confirm reciept.

Best--

Mark

Mark G. Ellis
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From: Mark Ellis [mailto:markellis@ima-na.org]
Sent: Sunday, October 26, 2008 1:46 PM
To: 'nioshdocket@cdc.gov'
Cc: 'markellis@ima-na.org'
Subject: FW: 099-A NIOSH Revised CIB Roadmap
Importance: High

Ms. Miller:

I recently visited the NIOSH docket for NIOSH Docket Number NIOSH-99A and discovered that the comments filed by IMA-NA were not posted. I'm sure that was just an oversight and I wanted to bring it to your attention. Kindly please confirm receipt and posting of the IMA-NA comments to the NIOSH docket.

Please let me know whether you have any questions regarding this matter.

Best--

Mark

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From: Mark Ellis [mailto:markellis@ima-na.org]
Sent: Tuesday, September 30, 2008 4:33 PM
To: 'nioshdocket@cdc.gov'
Cc: 'markellis@ima-na.org'
Subject: 099-A NIOSH Revised CIB Roadmap

Ms. Diane Miller
NIOSH Docket Office
Robert A. Taft Laboratories
4676 Columbia Parkway, MS C-34
Cincinnati, OH 45226

RE: Revised Draft Document: *Asbestos and Other Elongated Mineral Particles: State of the Science and Roadmap for Research;* NIOSH Docket Number NIOSH-099A

Dear Ms. Miller:

Please find attached the comments of the Industrial Minerals Association - North America (IMA-NA) on the above-referenced revised Roadmap document. The comments IMA-NA provided on NIOSH Docket Number NIOSH-099 are incorporated by reference in our most current filing.

Please let me know whether you have any questions regarding this matter.

Best--

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Industrial Minerals Association — North America

September 30, 2008

Ms. Diane Miller
NIOSH Docket Office
Robert A. Taft Laboratories
4676 Columbia Parkway, MS C-34
Cincinnati, OH 45226

RE: Revised Draft Document: *Asbestos and Other Elongated Mineral Particles: State of the Science and Roadmap for Research;* NIOSH Docket Number NIOSH-099A

Dear Ms. Miller:

The Industrial Minerals Association – North America (IMA-NA) is a Washington, DC-based trade association created to advance the interests of North American companies that mine or process minerals used throughout the manufacturing and agricultural industries. IMA-NA membership also includes companies that provide equipment and services to the industry.

IMA-NA has reviewed the above-referenced Revised Draft Document (revised Roadmap) developed by the National Institute for Occupational Safety and Health (NIOSH) and is pleased to offer the following comments. At the outset, IMA-NA reminds NIOSH that it previously submitted comments on its initial draft document: *Asbestos and Other Mineral Fibers: A Roadmap for Scientific Research* (NIOSH Docket Number NIOSH-099)(Roadmap). IMA-NA incorporates by reference its previous submission as part of these comments.

IMA-NA again wishes to commend NIOSH for the contributions it has made to promoting occupational safety and health. The NIOSH revised Roadmap document on asbestos, particularly those sections related to the scientific research framework, has the potential to make additional contributions in the area of occupational health, but requires modification, specifically with regard to the pronouncement of NIOSH policy.

IMA-NA is on record as supporting regulatory changes to better protect workers potentially exposed to asbestos hazards on the job, particularly miners. For instance, IMA-NA concurs with the key provisions of the Mine Safety and Health Administration's (MSHA) final rule updating its regulation of asbestos. Specifically, IMA-NA supports the reduction of the MSHA permissible exposure limit (PEL) for full-shift exposures and the excursion limit earlier adopted for asbestos by the Occupational Health and Safety Administration (OSHA). IMA-NA further supports the continued use of phase contrast microscopy (PCM) for initial quantification of asbestos fibers in air with the use of transmission electron microscopy (TEM) as needed to aid in

the identification of asbestos. IMA-NA also supports MSHA's approach to control take-home asbestos contamination on work clothing.

In aligning its final rule with the OSHA asbestos standard, MSHA accepted OSHA's risk assessment in lieu of conducting its own. However, IMA-NA supported the inclusion of other asbestiform amphibole minerals if they clearly demonstrate a health risk similar in magnitude and scope to the asbestiform amphiboles currently regulated as asbestos and to which miners are exposed. It also supported extension of the rule to all mining environments.

With this background in mind, IMA-NA believes that NIOSH made a significant mistake by inappropriately expanding the scope of the draft Roadmap from a proposed pathway for scientific research to a hybrid document incorporating broad statements of NIOSH policy. In the process NIOSH has injected its own perception of the state of the science and colored the proposed research agenda.

The draft revised Roadmap now is cast as a Current Intelligence Bulletin. According to the NIOSH Web site, Current Intelligence Bulletins "review and evaluate new and emerging information about occupational hazards." IMA-NA finds this at odds with the stated goal of the Roadmap and revised Roadmap:

> The purpose of the Roadmap is to outline major areas of controversy and to recommend a research framework that can serve as a guide for the development of specific research programs within and across disciplines. The intended goals of the research to be undertaken are to provide answers to current scientific questions, reduce scientific uncertainties, and provide a sound scientific foundation for future policy development so that optimal health protection can be assured.

IMA-NA fully supports this statement of the Roadmaps' intended purpose, but objects to NIOSH putting the policy "cart" before the science "horse." For instance, NIOSH uses the draft revised Roadmap document as the vehicle to revise its recommended exposure limit (REL) for asbestos and expand its scope specifically to include elongated mineral particles (EMPs). Where the initial draft document was primarily a research roadmap, once finalized the revised draft document would assume regulatory consequence. OSHA and MSHA are statutorily required to propose NIOSH RELs, typically contained in criteria documents, as permissible exposure limits (PELs) or formally announce their reasons for not doing so. Moreover, legislation currently pending in Congress would mandate that MSHA adopt NIOSH RELs as PELs. Discussion of the NIOSH REL, as currently constituted or as revised, has no place in a scientific research roadmap.

The draft revised REL makes clear that even though EMPs included in the count are not necessarily asbestos fibers, they will be treated as if they are asbestos fibers. It was IMA-NA's impression that the purpose of the Roadmap and revised Roadmap documents is to provide answers to just these types of current scientific questions. Consequently, IMA-NA recommends a return to the original and proper purpose of the Roadmap document, namely providing a framework for scientific research. NIOSH should refrain from casting the revised Roadmap document as a Current Intelligence Bulletin and refrain from using it as a vehicle for rendering policy pronouncements, such as the proposed revision to the REL for asbestos fibers.

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In its previous comments IMA-NA took exception to the term "fiber-like" cleavage fragments that NIOSH utilized throughout the Roadmap document. IMA-NA remarked that the term was a misnomer and was misleading, and that its continued inadvertent and improper use might lead to treating elongated amphibole cleavage fragments as asbestos fibers. Specifically, IMA-NA was concerned about the possible application of arbitrary fiber-counting criteria to "define" asbestos rather than to simply count asbestos fibers once identified. This unintended outcome would run counter to cleavage fragment health science. In light of the NIOSH proposed revision of the REL for asbestos fibers, that concern appears well founded.

NIOSH did drop use of the "fiber-like" descriptor in the revised Roadmap, but instead of recognizing a distinct difference between asbestos fibers and cleavage fragments NIOSH coined an entirely new descriptor: "elongated mineral particles" (EMPs). The bright-line distinction IMA-NA believes the draft Roadmap and revised Roadmap should convey regrettably continues to be obscured because EMPs include both asbestos fibers and cleavage fragments. Although NIOSH dropped its "unified theory" from the revised Roadmap, it continues to link asbestos fibers and cleavage fragments. NIOSH should refrain from linking the two by conjoining "asbestos fibers" and "elongated mineral particles" with the phrase "and other." IMA-NA recommends that NIOSH address asbestos fibers and cleavage fragments separately. We once again refer NIOSH to the comments on the "cleavage fragment issue" IMA-NA previously submitted on the draft Roadmap document (see pages 2-6 and accompanying attachments).

What is needed is development of an analytical method, likely involving a series of analytical steps and clearer definitions, which can distinguish between asbestos fibers and cleavage fragments. The revised Roadmap recognizes this need and it should be made a top research priority. For instance, polarized light microscopy (PLM) always has been used to identify minerals, mineral types, and mineral habit characteristics prior to and during development of x-ray diffraction (XRD), scanning electron microscopy (SEM), and transmission electron microscopy (TEM) techniques. Its continued use should not be discounted. Similarly, more advanced techniques, such as SEM, may offer promise in differentiating asbestos fibers and cleavage fragments. NIOSH should investigate use of the full suite of analytical tools available to lend precision to the mineral identification process. NIOSH then could establish an REL specific to asbestos fibers. Importantly for the industrial minerals industry, development of such an analytical method would preclude nonasbestiform cleavage fragments from being improperly characterized as asbestos fibers.

IMA-NA disagrees with the conclusion in the draft revised Roadmap that the epidemiological studies previously conducted on worker populations exposed occupationally to nonasbestiform analogs of asbestos varieties are inconclusive. These studies generally can be considered negative for asbestos-related disease.

Several peer reviewers of the draft Roadmap document commented that new epidemiological studies of asbestos-exposed populations would be of limited value because exposure to asbestos fibers had decreased markedly over the years. In contrast, worker populations continue to be exposed to cleavage fragments, although these exposures likewise have decreased over the years. Rather than relying exclusively on *in vitro* and *in vivo* toxicological testing to determine conclusively whether cleavage fragments cause the same health effects as asbestos fibers, the revised Roadmap should express a strong preference for epidemiological studies of worker

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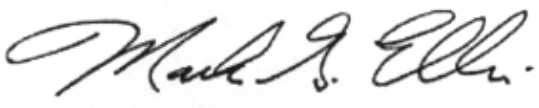
populations exposed occupationally to nonasbestiform analogs of asbestos varieties to make this determination. These studies should be rigorously designed to minimize confounding variables and resolve definitively, to the extent possible, the issue of whether exposures to nonasbestiform analogs of asbestos varieties produce the same health effects as asbestos fibers. Given diverse geology special care must be taken to properly characterize the mineral exposures involved in these epidemiological studies.

In vitro and *in vivo* studies of the various nonasbestiform analogs can help determine whether additional epidemiological studies are even necessary. Properly designed toxicological studies, utilizing properly characterized materials (examining such characteristics as mineral composition, dimension, biopersistence, surface chemistry, etc.) could help inform issues of relative mineral particle toxicity. IMA-NA believes the existing *in vitro* and *in vivo* studies that address nonasbestiform elongated mineral particulate consistently demonstrate a difference in biologic effect when contrasted with asbestos fibers. However, in light of the existing negative epidemiological studies, IMA-NA takes exception to the exclusive use of *in vitro* and *in vivo* toxicological testing to definitively determine whether EMPs cause the same adverse health effects as asbestos fibers.

Finally, in its response to the peer reviewers of the initial draft Roadmap document, NIOSH indicated that it currently was exploring having the revised Roadmap document reviewed by the National Academies of Sciences (of which the Institute of Medicine is a component). IMA-NA endorses such a high-level scientific review to validate the scope and direction of the NIOSH research agenda relative to asbestos fibers and nonasbestiform cleavage fragments. IMA-NA encourages NIOSH to pursue this additional review and would be pleased to assist the National Research Council/Institute of Medicine committee in whatever way it can.

In summary IMA-NA believes the revised Roadmap document should be a pathway for scientific research exclusively and not comingled with a NIOSH policy document with its regulatory consequences. Care must be taken to not inadvertently and improperly blur the distinction between asbestos fibers and cleavage fragments. Consequently, the research agenda should include development of an analytical method specific to asbestos that can distinguish nonasbestiform cleavage fragments from asbestos fibers. Lack of such a discerning analytical technique poses a significant problem for the mining community (especially with a reduced PEL for asbestos fibers) and hampers the ability to perform meaningful risk assessment. Cleavage fragments do not produce the same health effects as asbestos fibers. However, to the extent that questions remain concerning the health effects posed by exposure to cleavage fragments, carefully designed toxicological and epidemiological studies can help inform subsequent policy development.

Respectfully submitted,



Mark G. Ellis
President

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Attachments

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IMA-NA
Industrial Minerals Association — North America

May 30, 2007

Ms. Diane Miller
NIOSH Docket Office
Robert A. Taft Laboratories
4676 Columbia Parkway, MS C-34
Cincinnati, OH 45226

RE: Draft Document: ***Asbestos and Other Mineral Fibers: A Roadmap for Scientific Research;*** **NIOSH Docket Number NIOSH-099**

Dear Ms. Miller:

The Industrial Minerals Association – North America (IMA-NA) is a Washington, DC area-based trade association created to advance the interests of North American companies that mine or process minerals used throughout the manufacturing and agricultural industries. IMA-NA membership also is open to companies that provide equipment and services to the industry.

IMA-NA has reviewed the above-referenced Draft Document (Roadmap) by the National Institute for Occupational Safety and Health (NIOSH) and is pleased to offer the following comments.

At the outset, IMA-NA wishes to commend NIOSH for the contributions it has made to promoting occupational safety and health. The NIOSH Roadmap document on asbestos research has the potential to make additional contributions in the area of occupational health, but requires modification.

IMA-NA is on record as supporting regulatory changes to better protect workers potentially exposed to asbestos hazards on the job, particularly miners. For instance, IMA-NA concurs with the key provisions of the current proposal by the Mine Safety and Health Administration (MSHA) to update is regulation of asbestos. Specifically, IMA-NA supports the reduction of the MSHA permissible exposure limit (PEL) for full-shift exposures and the excursion limit earlier adopted for asbestos by the Occupational Health and Safety Administration (OSHA). IMA-NA further supports the continued use of phase contrast microscopy (PCM) for initial quantification of asbestos fibers in air with the use of transmission electron microscopy (TEM) as needed to aid in the identification of asbestos. IMA-NA also supports MSHA's proposed approach to control take-home asbestos contamination on work clothing.

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In aligning its proposed rule with the OSHA asbestos standard, MSHA accepted OSHA's risk assessment in lieu of conducting its own. However, IMA-NA would support the inclusion of other asbestiform amphibole minerals if they clearly demonstrate a health risk similar in magnitude and scope to the asbestiform amphiboles currently regulated as asbestos and to which miners are exposed. Extension of this proposal to all mining environments appears reasonable as well.

IMA-NA first takes exception to the term "fiber-like" cleavage fragments that NIOSH utilizes throughout the Roadmap document. The term is a misnomer and misleading. Its continued inadvertent and improper use may lead to treating elongated amphibole cleavage fragments as asbestos fibers. Specifically, IMA-NA is concerned about the possible application of an arbitrary fiber-counting criteria to "define" asbestos rather than to simply count asbestos fibers once identified. This unintended outcome would run counter to cleavage fragment health science.

The "cleavage fragment issue" (as it is often called) has a long and often contentious history. For this reason IMA-NA and many others commented extensively on this issue during MSHA's Advance Notice of Proposed Rulemaking (ANPRM). MSHA is fortunate to have a 1992 OSHA rulemaking to review that includes a risk analysis specific to amphibole cleavage fragments. 57 FR 24310-24331. We encourage NIOSH to fully review that OSHA rulemaking proceeding and have attached a copy for your convenience (**Attachment 1).**

The adoption of an overly broad asbestos definition could transform major portions of the earths crust into asbestos and cause significant harm to segments of the mining and aggregates industries with no offsetting benefit to miners' health. The impact of regulating amphibole cleavage fragments as asbestos was described by the Bureau of Mines (BOM) in it's submission to the OSHA rulemaking docket in 1989. A copy of the BOM impact statement is appended (**Attachment 2**).

IMA-NA hopes NIOSH understands that the analytical methodology for the quantification of asbestos fibers in air is not specific to asbestos. We are, in fact, aware of no analytical method that is specific to asbestos. The commonly applied NIOSH PCM method 7400, NIOSH TEM method 7402, OSHA ID-160 (the PCM method that MSHA specifically incorporates through OSHA Appendix A), for example, properly state that elongated cleavage fragments are "interferences" when used for asbestos quantification (see **Attachment 3** – highlighted statements in methods). Even when applied by accredited laboratories, available analytical methods will not identify asbestos consistently and reliably ***for the analyst.*** Instead, it is knowledge of the nature of asbestos and its appreciation ***by the analyst*** that most influences the consistency and reliability of asbestos identification.

Several highly regarded mineral scientists (Dr's Wylie, Lee, Chatfield and Ross) testified before MSHA during the ANPRM phase of this rulemaking. These experts have researched and published on the mineral characteristics of asbestos for decades and appeared at the request of the National Stone, Sand and Gravel Association (NSSGA). These highly experienced analysts also cautioned MSHA that there currently is no analytical method specific to asbestos and that existing methods are only tools ***that aid*** in the identification and quantification of asbestos when

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the fiber exposure is not known 'a priori' to be asbestos (as is often the case in mining environments).

These analysts also recommended analytical modifications that would improve specificity in the qualification and quantification of asbestos. These modifications spoke principally to PCM differential fiber-size counting criteria that are more specific to asbestos (an identification approach recommended in OSHA's own Appendix B ID-160 PCM method – see Attachment 3). **Attachment 4** to this submission provides several quotes from the testimony of these experts which we feel reinforce our concerns. IMA-NA encourages NIOSH to review the full oral testimony and written comments of these noted scientists.

Given the above concerns, IMA-NA is pleased to submit the following specific recommendations:

1. The NIOSH Roadmap document should include an accurate and complete description of the asbestiform and nonasbestiform crystal growth habit. We suggest a consensus definition that appeared in one of our submissions for the MSHA ANPRM entitled: "*The Asbestiform and Nonasbestiform Mineral Growth Habit and Their Relationship to Cancer Studies*." We are submitting this document to NIOSH as it addresses the key mineralogical distinctions clearly and concisely, provides a review of the pertinent health science base and a differential fiber counting PCM method "more" specific to asbestos (see **Attachment 5)**. Please note a listing of the contributors and supporters of this consensus definition on page 64 of that document relative to their backgrounds and qualifications as geologists and mineral scientists. IMA-NA supports calling any substance by its proper name and regulating that substance on the basis of its demonstrated adverse health effects. IMA-NA does not view "difficulty" as a viable justification to mischaracterize exposures, but rather as a reason to make needed advancements.

2. As no analytical method is specific to asbestos, IMA-NA suggests encouraging the use of all available scientific literature and mineralogical expertise to complement existing analytical methods. Until such time as an asbestos-specific analytical protocol is developed, all available tools must be used in equivocal exposure circumstances (when the exposure is not known 'a priori' to be an asbestos exposure). IMA-NA believes the scientific literature in regard to distinguishing asbestos fibers from elongated nonasbestiform fibers is reasonably extensive and should be consulted. One reference example (which also addresses amphibole from Libby, Montana) can be found in **Attachment 6.**

3. NIOSH further should provide guidance to help the regulated community make this key distinction by adopting the steps taken by OSHA to enhance the reliability of identification when needed. OSHA allows for "differential" fiber counting to provide latitude to the analyst to use his/her expertise and all available information helpful in making the proper distinctions. OSHA further allows and encourages the use of Polarized Light Microscopy (PLM) bulk analysis applied by qualified individuals as another tool to be used in the identification of asbestos. OSHA includes Appendix C in

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its asbestos standard for this purpose (see **Attachment 7).** This Appendix C PLM method includes additional descriptive guidance that aids the analyst in the identification of asbestos. **Attachment 8** contains 1989 correspondence from the OSHA laboratory that outlines how the agency analytically addresses this matter.

In recommending the use of bulk analysis, IMA-NA is not suggesting bulk analysis be used in place of air sampling (recognizing the regulatory compliance aspect of air sampling), but rather as an additional tool to enable the analyst to properly characterize the exposure. Of course if representative bulk analysis clearly shows the absence of asbestos, the need for air sampling can be better assessed. Analysts consistently testify that it is much easier to identify asbestos in bulk material (where the full range of asbestiform growth characteristics is commonly seen) than based on a few "fibers" or a single fiber on an air filter. Again, the characteristics of asbestiform fibers (widths independent of length, polyfilamentous bundling of fibrils, etc.) are best seen on a population basis (the bigger the population, the easier to distinguish). Such characteristics extend beyond merely "parallel sides" (also observed among cleavage fragments). Proper discrimination of fibers, of course, becomes a more critical issue as the PEL is reduced.

4. IMA-NA encourages the review of all available geological information on ore deposits to better understand the nature of mining exposures as well. We view this advice of particular importance to MSHA given the complexity of many mining environments and, therefore, the increased likelihood of identification questions.

The NIOSH Roadmap document notes that IMA-NA and NSSGA have suggested other procedures with the intent that fiber counts on air samples do not include cleavage fragments. Roadmap at page18. Stated somewhat differently, IMA and NSSGA have suggested other procedures with the intent that fiber counts on air samples do not include cleavage fragments as asbestos. The NIOSH Roadmap goes on to state that whether these suggested procedures would assure adequate health protections for exposed workers is unclear, and the practical issues associated with implementing these supplemental procedures are also undetermined.

IMA-NA submits that it is just these types of issues that the NIOSH Roadmap document can, and should, address. The NIOSH research agenda should not be dictated by adherence to definitions and analytical techniques developed in the past that fail to meet current realities and needs. IMA-NA would be pleased to work with NIOSH to develop a research agenda to better define asbestos and to differentiate asbestos from amphibole cleavage fragments.

To that end, IMA-NA reiterates for NIOSH the recommendation made to MSHA to improve its proposed asbestos rule:

56.5001 (amended) – 57.5001 (amended) and 71.702

(b) *Asbestos standard.*

(1) Definitions. Asbestos is a generic term for a number of hydrated silicates that, when crushed or processed, separate into flexible fibers made up of fibrils. As used in this part –

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Asbestos means chrysotile, amosite (cummingtonite-grunerite asbestos) crocidolite, anthophyllite asbestos, tremolite asbestos and actinolite asbestos **and does not include non-fibrous or nonasbestiform minerals**.

***Asbestiform* means a mineral that crystallized with the habit (morphology) of asbestos. The asbestiform crystal growth habit is generally recognized by the following characteristics which are best observed on a population basis and therefore best observed in bulk samples:**

Mean fiber aspect (length to width) ratios ranging from 20:1 to 100:1 or higher for fibers longer than 5 micrometers. 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**

***Fiber Counting Criteria* are 5 micrometers (μm) or longer with a length-to-diameter ratio of at least 3:1.**

(2) Permissible Exposure Limits (PELs). – (i), (ii) - (no change recommended)

*(3) Measurement of **Asbestos**.* **Airborne asbestos** fiber concentration shall be determined by phase contrast microscopy using a method statistically equivalent to the OSHA Reference Method in OSHA's asbestos standard found in 29 CFR 1910.1001, appendix A **when the exposure is known 'a priori' to be only commercial asbestos (not mixed dust).**

When a fiber exposure is not known to be asbestos (or is otherwise equivocal) or is a mixed dust exposure, additional investigation is necessary because no currently available analytical method is specific to airborne asbestos. This additional investigation shall include the following:

- **Review of available geological information for the identification of regulated asbestiform mineral occurrences in the mining deposit.**

- **The analysis of bulk samples (ore, insulation, settled dust, etc.) that is representative of the miner's work area exposure. OSHA appendix C 29 CFR 1910.1001 (Polarized Light Microscopy Method) or an equivalent method, shall be used for bulk analysis. The absence of asbestos in bulk samples shall eliminate the need for air sampling and/or analysis of particulate on air filters. The presence of asbestos in the bulk sample at any level will require personal air sampling or analysis of collected air samples.**

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- **On air samples analyzed by PCM or TEM, the characteristics of asbestos fibers defined in section (b) 1 above, described in OSHA appendix C and supported in OSHA appendix B, shall be observed.**

- **Bulk and air samples that have been analyzed with results indicating the presence of asbestos at any level, shall be retained for a period of no less than one year for possible reanalysis. This sample retention requirement will be applied to mine operator and MSHA collected samples.**

In summary IMA-NA believes there is need for caution in this area because current analytical methods are not specific to asbestos and this poses a significant problem for the mining community (especially with a reduced PEL). The proper identification of asbestos calls for enhanced education, improved methodology, and better use of the existing knowledge base regarding the nature of asbestos. IMA-NA believes NIOSH is in a unique position to highlight and support these needed improvements.

Respectfully submitted,

Mark G. Ellis
President

Attachments

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Attachments to Comments

of the

Industrial Minerals Association – North America

on the

National Institute for Occupational Safety and Health

Draft Document

Asbestos and Other Mineral Fibers: A Roadmap for Scientific Research

(Click on link to view attachment)

Attachment 1
http://www.msha.gov/regs/comments/05-14510/AB24-COMM-107-1.pdf

Attachment 2
http://www.msha.gov/regs/comments/05-14510/AB24-COMM-107-2.pdf

Attachment 3
http://www.msha.gov/regs/comments/05-14510/AB24-COMM-107-3.pdf

Attachment 4
http://www.msha.gov/regs/comments/05-14510/AB24-COMM-107-4.pdf

Attachment 5
http://www.msha.gov/regs/comments/05-14510/AB24-COMM-107-5.pdf

Attachment 6
http://www.msha.gov/regs/comments/05-14510/AB24-COMM-107-6.pdf

Attachment 7
http://www.msha.gov/regs/comments/05-14510/AB24-COMM-107-7.pdf

Attachment 8
http://www.msha.gov/regs/comments/05-14510/AB24-COMM-107-8.pdf

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