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NIOSH Mail Stop C-34 Robert A. Taft Laboratory 4676 Columbia Parkway, MC-C34 Cincinnati, Ohio 45226 April 12, 2010

RE: NIOSH Current Intelligence Bulletin - Asbestos Fibers and Other Elongate Mineral Particles: State of the Science and Roadmap for Research – Version 4

Gentlemen:

The National Institute for Occupational Safety and Health (NIOSH) has invited comment on the fourth revision of its Roadmap initiative. R. T. Vanderbilt Company, Inc. (RTV) is pleased to provide the appended observations.

RTV has previously outlined its involvement and interest in the issues addressed in this NIOSH initiative. RTV holds the Institute in high regard with respect to its efforts to further the health and safety of American workers. The company has expressed concern, however, over how NIOSH has approached the understanding and management of asbestos fibers and non-asbestos elongate mineral particulate (EMPs) over a period of decades. RTV is not alone in expressing repeated concern in this area.

The Roadmap initiative does recognize many issues of interest. Public comment as well as the National Academy's review committee has improved the Roadmap initiative with respect to the importance of proper mineral nomenclature. Unfortunately, we believe that NIOSH has not addressed existing health studies linked to asbestos fibers and other elongate mineral particulate fully and accurately.

Appended are updated comments linked to specific pages and lines in the fourth draft of the Roadmap. These comments focus exclusively on references to RTV talc found in the document because the manner in which RTV talc is discussed exemplifies broader, ongoing concerns. The impression is left that a risk conclusion concerning EMPs has already been reached by the Institute and that studies that might contradict that conclusion are addressed in a less than balanced way.

RTV believes that the Roadmap continues to "imply" that an asbestos fiber risk exists for all durable elongate mineral fragments at some as yet unspecified particle dimension. RTV believes this is an overly simplistic vision and that the existing science base does not support such a broad "same as" association. Other investigators, scientific bodies and regulatory agencies have concluded similarly.



The following RTV talc-linked comments reflect this concern, though they are by no means the only examples. Each is more fully addressed in the appended comments:

- The mention of elevated mesothelioma rates in some New York State counties is not necessary. Updated information confirms that the reported elevated rates do not exist and that the suggested link to regional talc mining is in error.
- The inaccurate/misleading description of the composition of RTV talc should be corrected. The composition of RTV talc is now well understood, this information is readily available and was previously provided.
- The use of "possible" explanations for why RTV talc mortality studies show an inverse exposure – response for cancer of the lung is inappropriate because available information points away from those explanations. These explanations are nevertheless presented without qualification.
- The ongoing failure to clearly report the inclusion of RTV talc samples (in total and in component concentrates) in animal studies and a cell study, in which RTV tale's carcinogenic response (i.e. none) differed significantly from asbestos tested in the same way.
- The inadequate discussion of an RTV talc worker versus Vermont talc worker comparison with respect to its significance to elongate amphibole particulate and other EMPs.
- The refusal to address more recent non-malignant respiratory disease experience among long-term RTV talc workers as an indicator of a non-asbestos EMP risk.

These lapses with regard to RTV talc are highlighted because we feel they exemplify a broader resistance to address the weight of existing health evidence with regard to elongated mineral fragments. This, in turn, affects the prioritization of research needs and implies risk where existing data argues to the contrary. We believe a tendency exists to obscure or downplay information that does not support a "same as asbestos" view for all durable elongated mineral particulate. In effect, Vanderbilt believes that NIOSH maintains a higher level of uncertainty than is reflected in the science base with respect to such particulate.

Very truly yours

R. T. VANDERBILT COMPANY, INC.

John W. Kelse, Corporate Industrial Hygienist

Director, Occupational Health

Comments: NIOSH Roadmap - 4th Revision

<u>Page 23 (lines 15-42):</u> "Excessive rates of mesothelioma have been reported for Jefferson County, which (along with adjacent St. Lawrence County) is a major site of the New York talc industry (Vianna et al. 1981; Enterline et al. 1987; Hull et al 2002)."

Comment: This statement, and other statements in the paragraph dealing with these counties, is not correct. Historical searches report that there was no talc mined in Jefferson County at any time. In prior comments (Sept. 2008) we reported that "With the possible exception of one or two mines (though we know of none specifically), all of these mines are located in St Lawrence County." This was later confirmed by the NY State Museum (Minerals Division - NYSED) and had also been noted by researchers in 2006 and a recent article (B. Price) accepted for publication in Critical Reviews in Toxicology 2010, 1-18, Early Online (pp 10). The only NY talc mine (with a different mineralogy – not involving amphiboles) closed in Lewis County in the late 1920's. Copies of these references are appended except the B. Price Article which can be obtained on line.

Independent verification is encouraged through New York State. Reported elevation in mesothelioma rates in Jefferson County are a moot point for reasons also pointed out by NIOSH (rate below average in St. Lawrence County and currently not statistically different in Jefferson County contrasted to SEER US rates, etc.). References to Jefferson County as a talc mining area should be corrected by NIOSH and not further repeated.

<u>Page 26 (lines 18-36):</u> "Thus the elemental composition of individual mineral particles can vary within a mineral deposit containing transitional minerals, which can account for the differences in the reported composition of talc from the RTV mine."

Comment: The above statement follows a paragraph that is unnecessarily misleading with respect to the composition of RTV talc. RTV talc is one of the most studied mineral products in the world for which copious references exist. Many of these references were provided in our correspondence of May 30, 2007 in appended File #1. These and additional references can be resubmitted if desired.

While early confusion concerning the composition of this talc did exist because (in part) it is a complex mineral mix, there is no excuse for compositional mischaracterization of RTV talc today. For example, reference to chrysotile and high percentages of anthophyllite noted in the Roadmap was once claimed to be part of the composition of RTV talc. The existence of chrysotile and high percentages of anthophyllite (in either crystal habit) has long since been shown to be in error. The expansive body of analytical investigation directed to RTV talc over a period of decades might be said to represent a "learning curve". The current state of knowledge concerning the composition of RTV talc should therefore be recognized and accurately stated.

As previously noted, RTV talc workers may have been the most exposed group of miners in the world to elongated amphibole cleavage fragments - in addition to other elongated mineral particulate (talc and transitional fibers - though to a much lesser extent). It would seem of particular importance, therefore, that this exposure be described as accurately and fully as possible considering the EMP focus of the Roadmap initiative.

Accurate characterization of RTV talc is directly linked to broader Roadmap issues. The non-specificity of some asbestos definitions, availability of mineral science expertise, the importance of clear exposure characterization in health studies and the status of analytical techniques and instrumentation are involved. These issues transcend RTV talc and provide insight into the very matters the Roadmap seeks to address.

RTV talc was further tested in two animal studies and one cell study later discussed in the Roadmap. None of this work produced a "same as asbestos" biologic response. In our view, this lends even more importance to providing the most up-to-date information possible with respect to the composition of this industrial grade talc.

In this RTV talc composition section, the Roadmap references a paper "prepared by Kelse (2005)" in regard to one description of the composition of RTV talc. It does not make clear, however, that the description of the talc composition which appears in the "Kelse" paper is based upon close to a dozen cited analytical efforts involving a number of highly regarded mineral scientists, laboratories and the Bureau of Mines. In the present version of the Roadmap, the reader is left with the impression that the Vanderbilt Company reports one composition (the Kelse paper) while others (presumably NIOSH) report another. In doing so, NIOSH allows unnecessary confusion to persist. The composition of RTV talc should no longer be a source of confusion and the expansive body of analytical work now available should not be ignored.

The discussion on page 26 lines 18-36 should reflect the current state of knowledge with respect to RTV talc and directly address prior sources of analytical error (described in several of these references). RTV believes a discussion of why and how analytical error occurred with respect to RTV talc further demonstrates why there is a need for improved precision and nomenclature when addressing all elongated mineral particles. Not to do so, we believe, is a missed opportunity.

<u>Page 25 (4-16)</u> "A plausible explanation that has been offered for the lack of exposureresponse in these studies is the observed excess of lung cancer was a result of exposures from employment prior to starting work at RTV. It has been suggested that many of these workers may have had prior employment in neighboring talc mines in upstate NY with similar exposures (NIOSH 1980). Not considering these exposures at these other mines could have substantially impacted results of exposure-response analysis."

AND

Page 26 -27 (38-44 & 1-5) "A major limitation of the epidemiological studies of RTV talc workers is the lack of an exposure-response analysis based on direct measurements

of airborne EMP concentrations - - the exposure metric used in the Honda et al (2002) study was respirable dust, which may not be correlated with exposure to EMPs."

Comment: Though these explanations for the inverse exposure-response observed are reasonable points, the plausibility of these explanations can be assessed utilizing available employment and dust monitoring records. This was addressed at some length in our comments of September 23, 2008.

<u>Tenure Issue:</u> In our prior submission several tables were included that spoke to earlier talc mine exposures among lung cancer cases with the shortest (< 1 yr.) RTV talc employment (17 out of 31 or 55% of the cases). Of the 17 cases with < 1 yr exposure, 13 had less than 3 months of exposure. Lung cancer experience among asbestos exposed populations, as we understand it, is not consistent with such brief exposures and would argue against a dust etiology in the case of RTV talc.

RTV believes it would be the short term RTV talc miners that are most key in respect to whether or not prior exposure did, in fact, play a role in the inverse exposure-response observed. Of the 17 short term workers, employment records showed 4 with "unclear" prior talc mining, 1 with one year of such exposure and 12 with no prior talc mining exposure. We also pointed out (and NIOSH recognized) that the Gamble case control study reported no prior employment correlation in regard to lung cancer mortality.

In response to this information, NIOSH noted that "The data provided by the commenter do not appear to support the idea that workers may have had prior exposures in other mines. However, as the commenter notes, this information is not complete." By "not complete" NIOSH referenced the fact that the prior exposure data only addressed 55% of the cases (the <1yr group). However, by "not complete" RTV was referring to the 4 out of 17 with "unclear" records among the <1yr. group – the subset most pivotal to NIOSH's speculation concerning prior exposures.

RTV does not believe it is appropriate for NIOSH to suggest an explanation for the inverse exposure-response with respect to tenure when available information actually points in the other direction. NIOSH is welcome to independently verify the work history of all the lung cancer cases but NIOSH should not further speculate when available information suggests the speculation more likely in error than not (or, at least, until NIOSH independently verifies these histories).

<u>Surrogate Exposure (respirable dust versus EMPs):</u> In our prior submission, RTV provided data tables that contrasted available respirable dust levels to fibers/cc data (all elongated particles with a 3 to 1 or greater aspect ratio – 5 micrometers or longer) by job category. RTV noted shortcomings of the comparison tables but concluded:

"It would seem reasonable that as respirable dust levels increase, respirable elongated mineral fibers (EMPs) present in the airborne dust, would also increase. Available comparison data does not appear to contradict this. The data set indicates that higher respirable dust levels "generally" do tend to reflect higher EMP levels."

In response to this submission, NIOSH recognized the shortcomings noted by RTV and then went on to cite a reference that states "Relationships between health outcomes and exposure to an agent of interest can be attenuated when a nonspecific exposure indicator is used as a surrogate for exposure to the agent of interest (Blair et al.)." Our concern with this alternative explanation (which NIOSH reinforced with the citation) is similar to the concern noted above with respect to tenure. NIOSH's possible explanation for the inverse dust exposure using respirable dust as a surrogate for elongated particulate is also less supported by available data then the converse.

It's interesting to note that much of the epidemiologic literature used to assess fiber risk also relied upon surrogate dust exposures as these were often all that were historically available. Early studies of asbestos exposed cohorts relied heavily upon impinger/knoimeter particle counts typically collected for short durations in fixed locations. Available respirable dust data used in the Honda study (previously provided) to which NIOSH refers, involved personal samples over full shifts. Though seemingly a better surrogate, its use is questioned in an instance were results do not support the Institutes long standing policy on elongate amphibole cleavage fragments.

Beyond the issue of respirable dust as a reasonable surrogate for respirable EMPs, there is other evidence linked to particulate exposure that we feel also shows an inverse lung cancer relationship with respect to RTV talc. This evidence includes NIOSH's own 1980 technical report. On table 12 of that report, mean fiber exposures (for particles > 5 micrometers long) are reported to be about the same or higher in the RTV talc mill as they are in the mine through the early 1970's (minus a single fixed sample obtained below a primary mine crusher in 1970). More workers were engaged in mill work and exposure to elongated cleavage fragments and talc fiber was the same or higher in the mill versus the mine. Despite this, the excess lung cancers occurred principally among the mine workers – 6 mill workers versus 19 mine workers (Honda, et al 2002). Five cases were described as having no or minimal dust exposure as well. *Table 12 from the early NIOSH report is appended*. There is no support for a causal association between the EMPs in RTV talc and lung cancer in these data.

The existing literature also provides an opportunity to compare different EMP exposures for different mining cohorts. Though study comparisons are problematic for a variety of reasons, several that currently exist would seem worthy of further consideration with respect to different EMP exposures. Such comparisons should be considered for future research - if they are not already.

For example, considerable data (including that reflected in appended Table 12 from the early 1970's), shows that EMP levels at the RTV talc mine and mill (in this case elongate tremolite cleavage fragments and talc fiber) are typically many times in excess of current asbestos workplace standards (almost always above 1.5 fibers/cc contrasted to an OSHA limit for asbestos of 0.1 fibers/cc as an 8 hr. TWA). Yet, the most recent RTV talc mortality study (spanning 42 years) records no mesothelioma deaths reasonably linked to the talc dust and does not support a dust etiology with respect to lung cancer. In contrast,

a dust causal link is indicated for non-malignant respiratory disease (NMRD) through the 1980's (Honda et al).

This RTV risk experience and EMP exposure might be contrasted with the Libby, Montana mortality studies of vermiculite miners and millers. In the Libby studies EMP exposures involved asbestiform amphiboles (winchite, richterite and tremolite) versus the amphibole cleavage fragments and talc fiber EMP exposure found at Vanderbilt. The asbestiform amphibole handled at Libby reportedly ranged from a few percent to upwards of 30%. While early airborne fiber levels at the Libby mine were reported as high, it is noted in the most recent study (Sullivan – 2007) that "by 1972 exposures in all work areas were less than 1 fiber/cc as an 8 hour TWA." In the Libby studies lung cancers are reported as cause-effect linked ("lung cancer increased with increased duration and cumulative exposure to airbone tremolite asbestos and other amphibole fibers" - Sullivan). In the most up-to-date RTV study, similiar considerations point away from a dust cause-effect link.

In the Libby studies, 12 to 15 meostheliomas are reported and causally linked to that EMP exposure. The most up-to-date mortality study of Libby miners covers a period up to 60 years for some workers and involves a cohort approximately 1/3 larger than the RTV talc cohort. While these study variables must be noted, if the elevated level of EMPs in RTV talc (containing 40-60% nonasbestiform tremolite) were "as bad as" the EMPs in Libby (containing a much lower percent asbestiform amphibole), the exposure-response effects should not be so disparate. It has been reported, as well, that tests of Libby vermiculite ore in animals also produced tumors while the same tests produced no tumors for the minerals found in RTV talc (Smith work – unpublished vermiculite results – see transcripts of recent Libby trial). Comparisons of this type would seem to stress the importance of clearly and accurately describing the nature of "EMPs" involved in health studies and avoiding overly broad, inaccurate characterization.

RTV requests that NIOSH note the fact that possible explanations for the lack of cause-effect in RTV talc studies are more likely not supported than supported. NIOSH should also independently verify work history information and more carefully review available exposure information before declaring RTV mortality studies equivocal based on explanations more likely to be incorrect than correct.

Weight of Evidence

RTV has recommended that readers of the Roadmap be informed of additional RTV talc risk information (beyond the mortality studies). This recommendation was made so that the "totality" of information pertaining to an exposure that contains copious non-asbestos EMPs not be obscured. Again, accurately describing EMPs is critical to recognizing and addressing the significance of data already in hand and critical to future research.

In the most recent version of the Roadmap NIOSH did include reference to the Lamm et al comparison of RTV talc workers (NY) to Vermont talc workers. This important comparison was not cited in earlier Road Map versions even though NIOSH worked with both talc cohorts and has described the nature of both dust exposures. In now citing this comparison, NIOSH correctly notes that the same lung cancer experience was recorded for both groups with greater than one year exposure.

While referencing this NY/VT comparison is important, it is still not made clear that the similarity in lung cancer mortality was observed even though NY talc contained high levels of elongated amphibole cleavage fragments and talc fiber in contrast to Vermont talc mining which did not. Instead, this rather important observation was relayed to the Roadmap readers as an "argument" made by the authors (Lamm, et al). NIOSH stated: "It has been argued (Lamm & Starr) that this provides evidence against the hypothesis that the lung cancer excess among RTV miners is related to exposure to asbestos or nonasbestiform EMPs, since these were not known to be present in Vermont talc. A similar pattern has been observed in the studies of talc miners and millers at RTV." In the present version of the Roadmap there is little discussion (beyond this quote) of the possible significance of this comparison even though it speaks directly to Roadmap issues. It is also interesting to note that nonmalignant respiratory disease among Vermont talc workers was roughly twice as prevalent as that seen among RTV talc workers.

RTV had also recommended that additional animal work be cited in subsequent Roadmap revisions (e.g. Smith study). NIOSH did cite the Smith study in the current version of the Roadmap but failed to make it clear that the samples that produced no pleural tumors in this hamster injection study involved RTV talc (the talc was tested as a whole product and as a concentrate of the nonasbestiform tremolite found in the talc). Samples containing tremolite asbestos tested in exactly the same way did produce tumors. While NIOSH failed to make clear what samples were what, NIOSH did not fail to highlight possible shortcomings of the Smith work (e.g. animals may not have lived long enough).

With respect to the hallmark rat implantation studies by Dr. Stanton, RTV talc samples were also tested (talc 6 and 7) and affidavits were provided as proof that these samples were RTV talc. Yet, reference to Stanton's work in the Roadmap extended only to its implications relative to "fiber" dimensions. There was no mention that RTV talc produced no tumors in Dr. Stanton's work even though it is known to contain copious elongated amphibole cleavage fragments and some talc fiber. A portion of the talc fiber in talc 6, in fact, did meet Stanton's critical dimensions (0.25 micrometer width or less – 8 micrometers long or more). Greater than 50% tumors would have been predicted by Stanton's hypothesis in the case of talc 6 – yet there were none (see Wylie, et al – Ind. Hyg.J 54 1993 and Wylie, Mossman, et al. Tox. & Applied Pharm. 147, 1997 – both previously provided).

Many scientists point out that data that doesn't "fit" should not be dismissed – especially when similar findings appear in other studies. Unexpected results often hold important clues and RTV has asked NIOSH to note these unpredicted observations in Stanton's work as others have (i.e. Wylie, Oehlert). NIOSH did point out the issues that such contradictions raise (is it just particle size, physiochemical properties, etc.). However, the Roadmap once again failed to identify these talc samples as RTV talc and therefore once

again obscured the totality of information concerning risk and the various forms of EMPs in RTV tale.

Similarly, in discussing the Wylie/Mossman cell study involving concentrated talc fiber extracted from RTV talc – it is not made clear that the talc fiber concentrate is from RTV talc. FD 14 was also addressed in that same cell study. FD-14 was a sample of RTV talc also used in the Smith hamster injection study. Readers of the Roadmap are not told that these studies involved RTV talc and concentrated mineral components of this talc. Controlling for dose and particle size, different effects were noted for concentrated talc fiber and asbestos samples.

Finally, the pulmonary status of RTV talc workers (as of 2008, 2000 and 1990) was provided in RTVs last submission. In that submission RTV explained why it felt the pulmonary status of this work group was important relative to asbestos and elongated fragments of the same mineral (again, a principle focus area of the Roadmap). It was noted in this submission that upwards of 60% of RTV talc workers had worked 20 years or more (30%, 30 yrs or more) as of our most recent surveillance effort in 2008. Importantly, these workers now almost all have had exposure only to RTV talc. In earlier studies of non-malignant respiratory disease among RTV talc miners and millers, that was not the case (considerable "other mine" exposures existed).

RTV believes the prevalence (not just occurance) of non-malignant respiratory disease seen among asbestos workers (asbestosis) is not seen among RTV talc workers. This is important to consider because exposure to elongated amphibole cleavage fragments among RTV talc workers exceeds the permissible limit for asbestos fibers by every published record – including the appended NIOSH work. Dose, therefore, can not explain the difference in effect. There is currently no evidence of a "same as" effect in our medical surveillance data. NIOSH, however, responded to this observation as follows:

"Dr. Boehlecke's reports do not appear to have much bearing on this issue. These reports are based on a series of cross-sectional examinations, which would be very unlikely to detect an excess of lung cancer or mesothelioma. He did identify individuals with pleural plaques and pulmonary fibrosis both of which are, in fact, consistent with findings in asbestos workers."

In the data provided only <u>one</u> individual (out of approximately 100) was identified with a clear dust linked pulmonary fibrosis following decades of talc exposure. It is our understanding that talcosis is a form of pulmonary fibrosis often indistinguishable from asbestosis on chest x-ray. We do not believe such a finding among RTV talc miners and millers would suggest an asbestos or "as bad as" asbestos exposure.

In terms of pleural plaque, the same prevalence of plaque is observed in other talc mining absent amphibole dust exposure as is seen among RTV talc workers. This observation was made by NIOSH itself and referenced by Dr. Boehlecke in his submission. Plaque, though indeed most often linked to asbestos exposure, is not exclusively linked to that

exposure. NIOSH not only does not mention the link between talc and plural plaque but states, without qualification, that, pleural plaques "are, in fact, consistent with findings in asbestos workers".

The point of providing the updated NMRD data for RTV talc workers was not the detection of lung cancer or mesothelioma (we agree with the NIOSH comments in that regard) – but rather whether long term RTV talc workers with a highly elevated exposure to elongated non-asbestiform tremolite cleavage fragments and talc fiber, did or did not reflect a NMRD risk similar in scope and magnitude to that observed in asbestos exposed populations. Dr. Boehlecke concluded they did not – NIOSH finds the information "not to have much bearing on this issue." RTV continues to believe it does have bearing and feels reconsideration is warranted.

Concluding Comment:

In terms of the weight of evidence, Vanderbilt believes its concluding statement made in our prior submission remains valid.

"—while improved, NIOSH continues to subtly "imply" an asbestos fiber risk for elongated cleavage fragments throughout the draft document. This occurs each time a study showing a difference between asbestos fiber and non-asbestiform particulate is critiqued by NIOSH as potentially faulty — or worse, when pertinent studies are not addressed at all. The strengths and weaknesses of studies should be recognized but care should be taken to avoid implying results may not be meaningful — especially if consistent with other studies and in the absence of evidence to the contrary."

Kelse, John

From:

Marian Lupulescu [MLUPULES@MAIL.NYSED.GOV]

Sent:

Tuesday, November 25, 2008 9:50 AM

To: Subject: Kelse, John Re: Fwd: Question

Mr. Kelse,

Dr. William Kelly, the New York State Geologist, answered to your question.

>>> William Kelly 11/25/2008 9:43 AM >>>

Mining for talc occurred in what was commonly referred to as "Natural Bridge, NY". This I think is a misnomer. The Town of Natural Bridge is in fact in Jefferson County. However it is just inside the Jefferson Co. line. The center of town is perhaps 1200 to 1400 feet west of the Jefferson Co. - Lewis Co. boundary. (On the 1951 topo map, the county boundary line is marked as "indefinite". That doesn't help.)

Talc development started in this area in 1909 according to our literature. The St. Lawrence Talc and Asbestos Company worked the mine at that time. First production was in 1911. In 1921 St. Lawrence was still listed as the operator but by 1927, the Carbola Chemical Company had acquired the mine.

However, the mine itself is actually about a mile and a half northeast of the Town of Natural Bridge. This puts the mine inside Lewis Co. and not in Jefferson Co. I'd guess that the location of the mine was given in relation to the nearest town for convenience. In this case the nearest town was Natural Bridge. I don't THINK there was another mine actually IN Natural Bridge, Jefferson Co., NY. K

>>> Marian Lupulescu 11/24/2008 1:33 PM >>> Bill,

Do we have to answer at this message?

Marian

>>> "Kelse, John" <JKELSE@rtvanderbilt.com> 11/24/2008 12:49 PM >>> A question has arisen in regard to talc mining in Jefferson County New York. Some references suggest such mining occurred in Jefferson County but in references I've seen (and conversations with geologists familiar with St. Lawrence County, Lawrence County and Jefferson County) - do not suggest it did. The key talc mining region in upstate NY, of course, is the Edwards/Balmat area in St. Lawrence County. Does your group have any information in this area. The question came up in regard to a literature review on population mortality rates and causes.



Comments on

Mesothelioma among Workers in Asbestiform Fiber-bearing Talc Mines in New York State.

Hull MJ. Abraham JL & Case BW (2002)
Annals of Occupational Hygiene 46 (Supplement 1): 132-135.

Is there an Association between Mesothelioma and Tremolitic Talc from New York State?

Ву

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analytical standard one would need to support their causation claim. The authors report having collected 36 cases in talc exposed workers and report on only 10 cases. Among the 10 selected the research materials available in each case are not the same. Selection bias has not been properly considered and addressed.

5. The authors report an increased incidence of mesothelioma in two counties in northern New York –St Lawrence and Jefferson (Figure 1). They claim a 5 to 10-fold increased risk of mesothelioma in Jefferson County due to exposure to tremolitic talc. Our review of the literature found only a single talc mine in Jefferson County which closed over 100 years ago. The tremolitic talc mines are located in St. Lawrence County where the mesothelioma incidence is below the average for both New York State and the United States (Figure 2). Analysis of New York State Cancer Registry, for the period 1998-2002, found the mesothelioma incidence in St Lawrence County to be indistinguishable from background. We did not find any evidence of increased mesothelioma incidence due to tremolitic talc in St. Lawrence County.

References

Abraham JL, Vallyathan V, Gamble J (1989) Correlative Analysis of Occupational, Exposure, Lung Pathology and Lung Particulate Burden in New York Talc Miners. *American Review of Respiratory Disease* 139: A553.

Abraham JL (1990a) Asbestosis, Talcosis, Mesothelioma and Non-Asbestos Amphibole Fibers and Cleavage Fragments in Lung Tissue of New York State Talc Miners. 23rd International Congress on Occupational Health and Medicine, Montreal, Canada, p. 170.

Abraham JL (1990b) Non-Commercial Amphibole Asbestos Fibers and Cleavage Fragments in Lung Tissue of New York State Talc Miners with Asbestosis and Talcosis. *American Review of Respiratory Disease* 141: A244.

Table 12

Summary of Historic Fiber Exposure Measurements in Mine and Mill Operations

	2						
Oneration	Mean	Fiber	Concer	Concentration (fiber	on (fi	^	5µm/cc
110 75	(1)	(2)	(2)	(2)	(2)	NIOSH	(2)
	0 / 6	1972	1973	1974	1975	1975	1976
	ω	4	-	_	-	~	2.4
Mucking	16	9	-	7) vo	r 1
Mucking	22	9			М	ν φ	α
Crushing	260	22	2	o	20	10	2 (2
	59	ľ	10	13	т	10	12
Crushing	13	2	14	9	0	ľ	α
Grinding	3.0		14	13	17	ο α	
Grinding	33			33	10	ο α	† ~
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(1)

Taken from reference 16 Calculated from MESA reports, references 33-43