Letters to the Editor

Dear Sir:

Recently I had occasion to review and evaluate an exchange of correspondence in your Forum section between Dement and Brown of NIOSH and L. D. Taylor of Schering-Plough Corporation on the subject of asbestos. Enclosed is a quotation from a paper which I gave recently It pretty well describes the situation.

The critical fact is the impression that the NIOSH authors gave that their finding that the New York talc ores and/or dusts did not contain fibrous talc was verified by McCrone Associates. In fact, McCrone Associates found fibrous talc *in every single product*.

I am enclosing a copy of part of the McCrone report about New York talcs which was obtained from NIOSH via the "freedom of information" route The McCrone words about fibrous talc are underlined in red. You will note the report was submitted to Dr. Dement, so obviously he was aware of its contents. Incidentally, I checked the same talc products on which Dement and McCrone worked and agreed with McCrone's identification, an identification that is extremely simple optically and amply verified by nearly a hundred years of published research

Where is science headed when some of its practitioners who have access to the most equipment and most money mislead fellow scientists?

Sincerely,

James R. Dunn
Chairman

Dear Sir:

It is not clear what point Mr. Dunn is attempting to make. First, Mr. Dunn states that NIOSH data were available to him only through the "freedom of information" route. Apparently, Mr. Dunn is unfamiliar with the published reports concerning NIOSH studies of New York talcs [1-4] Furthermore, full text copies of all NIOSH analytical reports as well as consultant reports were combined into one NIOSH report entitled "Industrial Hygiene Study of the Gouverner Talc Company, Number One Mine and Mill" which has been available for public distribution for more than 6 years.[5]

Mr Dunn's second argument is that we misidentified fibrous talc as anthophyllite and incorrectly used consultant reports to support this conclusion. This is entirely incorrect. We never have maintained that New York talcs do not contain fibrous talc based on our own analyses or those of consultants. This is amply supported by the published reports.[1,4,5] During our industrial hygiene study of New York talc mining and milling operations, we analyzed airborne dust samples by analytical electron microscopy to identify fiber types.[6] Of all the fibers analyzed, 12-19% were identified as tremolite, 38-45% as anthophyllite, 1-2% as nonasbestos fibers and the remaining 38-39% not identified as asbestos Contrary to Mr. Dunn's statement that fiber "identification is extremely simple", this is not the case and most certainly not with an optical microscope alone. Many of the fibers which we did not identify as amphiboles by electron diffraction are in a state of alteration between amphiboles and talc and actually may not belong to any given mineral category. These fibers are also very fine in diameter and may not be specifically identified by optical microscopy alone In selectively quoting from the McCrone report, Mr. Dunn ceases upon an honest discussion of whether or not fibrous amphiboles observed in New York talc are calcium bearing anthophyllite versus low calcium tremolite to imply that fibrous talc has been misidentified as anthophyllite asbestos. This is not the case and the fact remains that, while these talcs do contain fibrous talc, they also contain up to 15% anthophyllite as stated in our letter. To further quote from the McCrone report mentioned by Mr. Dunn "the aspect ratios of many of the fibers observed are quite high and numerous fibers — showed the classic fibrous structures of the asbestos minerals. There is no doubt in our minds that these are indeed fibers rather than cleavage fragments of a more massive amphibole." In the report mentioned by Mr. Dunn which found 15% anthophyllite in a New York talc sample, McCrone stated that the anthophyllite was "mostly if not all fibrous".

Mr. Dunn also has selectively quoted from the Mt. Sinai School of Medicine report. Mr. Dunn states that "Rohl of Sinai found anthophyllite to vary from not detectable to 9%." What Mr. Dunn does not state is that Rohl found non-detectable levels of anthophyllite in two samples by x-ray diffraction This method had a lower limit of detection of 2% for anthophyllite. Rohl found abundant fibrous particles in all samples analyzed. Many of these fibers were identified as amphiboles by electron diffraction. Rohl identified the long, thin amphibole fibers as anthophyllite while the shorter prismatic amphiboles were identified as tremolite. Mr. Dunn has not presented these facts.

There is not doubt that New York talcs represent a complex mineral assemblage and a significant analytical challenge; a fact which we have recognized. In order to provide the reader with useful information from this exchange, it is appropriate to summarize results of the NIOSH industrial hygiene studies of New York mining and milling operations. Results of airborne fiber exposure measurements by phase contrast microscopy are given in Table I. TWA fiber exposures (all fiber types) were found to range from 0.2 to 16.0 fibers/cc. with peak levels as high as 29 fibers/cc. These

TABLE I
Summary of Fiber Exposures in New York Talc Mining and Milling Operations as Determined by Phase Contrast Microscopy

Operation	Fiber Concentrations (Fiber > μm/cc) Range of TWA Exposures	Highest Peak[A] Conc.
Mine (N=54)	0.8 - 9.8	18.2
Mill (N=168)	0.2 - 16.0	29.1

N = Number of individual samples collected
TWA = Time-weighted-average exposures
[A]Based on highest concentration observed for a single sample

TABLE II
Summary of Airborne Fiber Types in New York Talc Mining and Milling Operations as Determined by Analytical Electron Microscopy

Fiber Length	Percent of All Fibers[A] Tremolite	Anthophyllite	Nonasbestos	Not Positively Identified
All Fibers	12-19	38-45	1-2	38-39
Fibers ≥ 5 μm	7	65	3	25

[A]Total number of fibers analyzed was approximately 1850

airborne dust samples were further analyzed by analytical electron microscopy to identify fiber types [6] Figures 1 and 2 show electron micrographs, electron diffraction patterns and chemical composition data for the two amphibole fiber types identified. Long, thin amphibole fibers were found to be anthophyllite while shorter, thicker amphiboles were tremolite. The fiber identification data are summarized in Table II. Of the fibers longer than 5 μm in length, 7% were tremolite, 65% anthophyllite, 3% definitely not asbestos and 25% not positively identified. As previously stated, many of the fibers which were not positively identified were thought to be in a state of alteration between talc and amphiboles.

No where in his letter does Mr. Dunn acknowledge the fact that New York talcs do in fact contain asbestos fibers. He does state that he has analyzed these and "agrees with McCrone's identification"; therefore, one must assume that he also agrees with McCrone's findings with regard to asbestos contamination. In any event, our methods and results have been presented for scientific scrutinity. Should Mr. Dunn have analytical results which demonstate the absence of asbestos fibers in New York talcs, these data along with associated analytical methods should be published Those with need for further information concerning New York talcs are encouraged to review the referenced reports first hand in order to draw their own conclusions.

References

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ar Sir:

a recent paper, Que Hee and Lawrence[1] reported protection ctors (PF) for the Racal AH-3 respirators under field conditions. lead fume the PFs varied from 6 to 30, as measured on several furnace personnel at a brass foundry. In their discussion the authors pointed out that "Laboratory data imply that protection factors for this respirator should be greater than 50. The protection factors associated with actual working conditions are expected to be lower than laboratory generated safety factors."

We have done limited studies on the laboratory measurement of protection factors for a Racal AH-5 helmet respirator which showed a similar range of protection factors. Our tests were done on model AH-5, an earlier version of the AH-3, but the results and discussion are relevant to the helmet style powered air purifying respirators.

The test aerosol was generated using a silica flour-sand mixture, in a 1 m^3 test chamber according to the method of Nelson *et al*.[2] A passive (non-breathing) mannequin was used to mount the helmet. Fresh helmet air filters and pre-filters were used for each test. "Respirable" dust was sampled inside and outside the test helmet using cyclone samplers. The concentration of dust on the filter was determined gravimetrically. The results are shown below:

TABLE I
Protection Factors:
Racal Airstream Dust Helmet Type AH-5

Test #	Concentration of Silica inside helmet (mg/m^3)	Concentation of Silica outside helmet (mg/m^3)	Protection Factor
1	1.55	7.87	5.1
2	2.57	11.75	4 6
3	0.33	8.91	27 2
4	0.53	10.32	19.5
5	0.37	5.78	15 7
6	1.51	13.89	9:2
7	0.57	14.56	26 0
8	0.23	11 93	52.9

Although limited in the number of tests performed our study indicated a surprising variability in protection factors. A variety of factors may account for the observed variance in PFs. A small fan was used in the test chamber for maintaining a uniform concentration of dust. Localized crossdrafts due to air movement near the mannequin head could have caused leakage inside the face shield; similar situations may be encountered in the workplace. Although every effort was made in maintaining the same head to helmet configuration during all tests some error may have resulted from inadequate positioning of the helmet. This factor can be controlled far more rigidly in a laboratory, as opposed to a work environment

The particle size of the test aerosol will have an effect on the helmet filter loading and consequently on the air flow rate exiting from the filter. The particle size of the aerosol inside the visor will be different from the particle size outside In-leakage around the inadequately sealed face areas will favour entrance of smaller particles as opposed to larger ones.

Hee and Lawrence made another interesting comment when describing their method: "The laddle attendants were followed to ensure they never raised their shields during the work cycle." One of the appealing aspects of helmet respirators is their comfort for the wearer as compared to the conventional tight-fitting full-face or half-face powered air purifying respirators. However, the relative ease of raising the face shield may be a potential disadvantage. This may be overcome somewhat by appropriate training and education

Nevertheless there is a definite need for more studies to fully characterize the protection factors of powered air purifying respirators in the laboratory and under field conditions. The availability of