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AMERICAN ATTAPULGITE - A BRIEF OVERVIEW OF THE HEALTH INFORMATION

Attapulgit Usage and Characteristics

Engelhard Corporation is a major producer of American attapulgit, a sorptive mineral which has been mined and processed in and around Attapulgis, GA, since 1920. American attapulgit has been used commercially for over 60 years in a wide variety of applications, including as an adsorbent and thickening agent, and very recently has been introduced as a partial replacement for asbestos in friction materials.

American attapulgit is composed of very short particles. Samples of American attapulgit were analyzed for particle size by the National Institute for Occupational Safety and Health (NIOSH) and found to have an average length of only 0.5 micrometers (μm). In fact, over fifty percent of the particles were less than 0.4 μm in length. The longest single particle measured was only 2.5 μm .¹

In contrast, material from some other parts of the world which have similar chemical composition and crystalline structure, have dramatically different particle morphologies and, in particular, substantially greater particle lengths. For example, some Spanish attapulgit was found to range between 2 and 8 μm in particle length with an average length of 3.5 μm . In addition, 62.5 percent of the Russian material, called palygorkaite after the Ural mining district where it is located, was shown to be longer than 2 μm ; and 30 percent of this material was found to be longer than 5 μm .²

To our knowledge, all attapulgit used in this country is mined and processed domestically, in and around the town of Attapulgis, GA. Therefore, all attapulgit encountered in the U.S. workplace is composed of very short particles, similar to those which were studied by NIOSH. Consequently, any health research on other, longer materials is not applicable to either American attapulgit or the American workplace.

Summary of Health Effects Research on American Attapulgit

NIOSH has been conducting both mortality and morbidity studies on American attapulgit workers since 1975. Its research has involved more than 2,300 workers mining and processing attapulgit since 1940. NIOSH found U.S. attapulgit not to be associated with either cancer or fibrogenic lung disease.³ In addition, they found no relation between reduced pulmonary function and cumulative dust exposure.⁴

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Summary of Health Effects Research on American Attapulгите (Continued)

In addition, the research of eminent American and European scientists, conducting independent experiments on laboratory animals and cell simulations, was reported to confirm that American attapulгите is neither carcinogenic nor fibrogenic. For example, Stanton's animal implantation work⁵ showed that the rate of tumorigenesis for two samples of American attapulгите was not different than that for negative controls.

More recently, Prof. Pott of the University of Dusseldorf Medical Institute for Environmental Hygiene, who has studied Russian palygorskite, French attapulгите, and American attapulгите, has shown that only the long Russian palygorskite was tumorigenic in laboratory animals. The American and French attapulгите, both of which are short, were found not to be different than the negative controls.⁶

Further, in evaluating a life span animal feeding study, using mice and 1 percent and 3 percent attapulгите, Prof. D. Schmahl of the Institute of Toxicology in Heidelberg, West Germany, concluded that there was no evidence that attapulгите was carcinogenic.⁷

Looking at the in vitro effects, Lipkin, of the National Cancer Institute, studied the effect of French and American attapulгите on macrophagelike cells. Using several samples of attapulгите, Lipkin found the results to be uniformly negative, i.e., there was no evidence of cell toxicity as measured by reduction in cell number over a 72-hour period in any of the experiments which he had done.⁸ He has also shown that this cell model correlates well with the in vivo studies conducted by Dr. Merle Stanton.⁹

Likewise, Woodworth, Mossman, and Craighead, of the University of Vermont, who studied the ability of attapulгите and other minerals to cause metaplastic changes in the tracheal mucosa of the Syrian hamster, found American attapulгите not to be statistically different than negative controls.¹⁰

In sum, the available epidemiological and experimental data concerning potential health effects of American attapulгите uniformly indicates that American attapulгите is not carcinogenic or tumorigenic and does not result in pulmonary dysfunction.¹¹

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FOOTNOTES

no *order* ① Zumwalde, R., Industrial Hygiene Study of the Engelhard Minerals and Chemicals Corporation. DSHEFS, NIOSH, CDC. April 29, 1977.

no ② Pott, F., Huth, F. and Friedrichs, K.H., "Tumorigenic Effect of Fibrous Dusts in Experimental Animals." Environmental Health Perspectives. 9:313-315, 1974.

no *order* ③ Waxweiler, R.J., Zumwalde, R.D., Ness, G.O. and Brown, D.P., Cancer Mortality Among Persons Mining and Milling Attapulgite Clay Fibers. Abstract for the Sixth International Symposium on Inhaled Particles, to be held September 2-6, 1985, in Cambridge, England.

no ④ Gamble, J., Sieber, K., Wheeler, R. and Reger, R., Attapulgite Clay Workers in the U.S.: An Evaluation of Respiratory Morbidity. Abstract for the Sixth International Symposium on Inhaled Particles, to be held September 2-6, 1985, in Cambridge, England.

no ⑤ Stanton, M.F., et al., Relation of Particle Dimension to Carcinogenicity in Amphibole Asbestosis and Other Fibrous Minerals, JNCI 67 (5) November 1981 pp. 965-975.

no ⑥ Pott, F., Matscheck, A., Ziem, U., Huhle, H., Huth, F., Animal Experiments with Chemically Treated Fibers - Abstract for the Sixth International Symposium on Inhaled Particles, to be held September 2-6, 1985, in Cambridge, England.

7 Unpublished reports available through Prof. H. Tuchmann-Duplessis - Universite Rene Descartes - U.E.R. Biomedicale - Laboratoire D'Embryologie - Faculte de Medicin - 45 Rue des Saints-Peres - 75006 Paris, Cedex 06 - France

no *order* ⑧ Lipkin, L.E., Failure of Attapulgite to Produce Tumors. Prediction of This Result by In-Vitro Cytotoxicity Test. Presented at the Third International Workshop on the In Vitro Effects of Mineral Dusts held in Schluchsee, West Germany. October 1-4, 1984.

no ⑨ Lipkin, L.E., Cellular Effects of Asbestos and Other Fibers: Correlations with In Vivo Induction of Pleural Sarcoma, Envir. Health Persp. 34, February 1980, pp. 91-102.

no ⑩ Woodworth, C.D., Mossman, B.T., and Craighead, J.E., Induction of Squamous Metaplasia in Organ Cultures of Hamster Trachea by Naturally Occurring and Synthetic Fibers, Cancer Research, Vol. 43, pp. 4906-4912, October 1983.

11 The research reported in this paper was conducted by persons or groups outside of Engelhard Corporation. While Engelhard believes it accurately reflects current scientific knowledge in this area, Engelhard can make no warranty regarding this information.

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