CONSTRUCTION PRODUCTS DIVISION

WRG 001215

7163167

PLAINTIFF'S EXHIBIT WRG-671

TO: R. M. Vining

DATE: June 28, 1972

FROM: H. A. Brown

SUBJ: Biological Tests on Tremolite

cc: H. C. Duecker

PERSONAL & CONFIDENTIAL

Attached is a memo which contains abstracts on two series of biological tests with asbestos fibers. From investigations over the past few months, certain indications are coming to awareness that there may be significant differences between the various types of fibers classified by Webster's Dictionary as asbestos fibers.

1.) The crystalline structure of the fiber may react differently in the lungs. Tremolite, for example, is not a spiral-type fiber such as chrysotile and crocidolite.

2.) There is some evidence that tremolite does not carry carcinogenic materials in the same manner as the other two fibers mentioned above.

3.) Pathological studies made by the researchers in the attached two abstracts highlight the differences in the fibers' effect on animals, but tremolite asbestos was not checked.

Duecker and I have discussed this and we are of the opinion that we should investigate the possibility of having tremolite as found at libby, and possibly South Carolina, evaluated in relationship to the other "bad actors". The approach would be to deal with one of the universities that has been doing work of this type and sponsor the tests on tremolite. I realize that it is difficult to assess whether to follow this path or leave it alone, but I believe it warrants some in-depth discussion.

H. A. Brown

HAB/cgr
Attachments

25113091

CAMBRIDGE

TO: H.A. Brown

FROM: H.A. Eschenbach

CC: T.L. Lyall

DATE: June 16, 1972

SUBJECT: Respirators - OSHA

REFERENCE: Your Memo, 15 June 1972

H. A. B.

I believe that the respirator you are interested in is the "RITE Whitecap" manufactured by Personal Environmental Systems, Inc., Box 800, Glendale, California 91209. It has been on the market for a little over a year, but until recently, it was not approved by the Bureau of Mines. A short time ago, they did approve it and Peter Kostic and Bob Oliverio discussed it and agreed that a field trial was worth our time and effort. Peter has been in Libby for the past week and may return with further information. We will keep you aware of progress in this project.

This respirator will enable workers to be exposed to fiber levels exceeding 10 times but less than 100 times the ceiling limit and time weighted average. I doubt if we have concentrations approaching these values.

I am awaiting the full abstracts of two papers presented at the American Industrial Hygiene Association Conference. Attached are brief abstracts. We plan to avail ourselves of more current information from this group and the A.M.A. as it develops. I have been circulating pertinent articles to Duecker and occasionally T. Lyall. If you are interested in this technical data, I will be happy to have copies sent to you also.

H.A. Eschenbach

HAE:mh

Enclosures

...nce also tended to have faster bronchial clearance ...between mucus production rate and bronchomotor ...their changes in autonomic nervous control of airway ...duce changes in the measured functions of particle ...city of mucus transport. Two drugs which modify ...ty, atropine and methacholine, were studied for their ...learance of inhaled particles in the donkey.

...n induced by atropine increased alveolar deposition ...eous secretion by the submucosal glands, tracheal ...uration of bronchial clearance were not significantly

...rind, increased bronchial deposition by inducing ...mulated mucus secretion and increased the rate of ...liary transport through the trachea was fast initially, ...ter stages, due to the accumulation of excess mucus, ...sis.

...IBUTION OF CHROMIUM FOLLOWING ...S

...stitute of Environmental Medicine, New York ...New York, New York

...y have implicated calcium chromate as one of the ...r problem. In current inhalation exposure studies, it ...e the early clearance and tissue distribution of ...cium chromate aerosols. Following six hours of ...d at timed intervals up to 48 hours. Chromium ...ned by atomic absorption following nitric acid ...known quantities showed a range of recovery from ...ge of 97 percent. The limit of detection for the ...g/ml with a working range from 0 to 10 μg/ml.

...s, concentrations of chromium in the lung remain ...to 24 hours. Urinary concentrations increase for up ...subsequent time periods. Concentrations in the gut ...ld suggest this route as a majo route of elimination ...other organs and the significance of these clearance

...by Grant No. PH43-NCI-66-962 from the National ...enter program supported by the National Institute of ...Grant No. ES00260.

161. THE EFFECTS OF MASS LOADING OF DUST ON BRONCHIAL CLEARANCE

C. PHILLIPS, M. LIPPMANN, Ph.D., and R. E. ALBERT, M.D., Institute of Environmental Medicine, N. York University Medical Center, New York, New York

Studies are being conducted to determine the effects of the mass loading of inert dusts on particle deposition and clearance. The effect of large amounts of inert dust on alveolar clearance, following intratracheal injection rather than by inhalation, has been studied by others. These studies showed that increasing the lung burden of particles increased the amount of alveolar clearance up to a point, beyond which clearance was reduced as the lungs became congested.

In-vivo inhalation tests are being conducted using high concentrations of preclassified coal dust. The test subjects are miniature donkeys whose bronchial clearance patterns were previously established. The coal dust aerosol has a CMD = 2.90μm and a σ_g = 1.30, as determined by optical sizing techniques. The retentions of ^{99m}Tc tagged ferric oxide particles in the deep lungs, main bronchi and upper thorax regions are measured simultaneously to determine the clearance waves in additional control tests, and in tests immediately following coal dust exposures.

The coal dust aerosol is generated with a Wright Dust Feed, which requires the use of dry compressed air. To eliminate the effects of dry air inhalation on the clearance pattern, a special humidifier was developed. The dust laden air stream leaves the humidifier at a dry bulb temperature of 38°C and a 95% relative humidity, and the donkey breathes from this 30 lpm air stream via nasal catheters. The breathing rate is monitored during the periods of dust inhalation.

The effects of high concentrations of coal dust on tagged particle clearance will be described and discussed.

162. BIOLOGIC DIFFERENCES IN RESPONSE TO LONG AND SHORT ASBESTOS FIBERS

W. E. SMITH, M.D., D. D. HUBERT, and M. S. BADOLLET, Florham-Madison Campus, Farleigh Dickinson University, Madison, New Jersey.

Six preparations of chrysotile were tested by intrapleural injection of hamsters with 25 mg sample suspended in 0.5 ml saline. Each preparation was tested in a group of 50 hamsters maintained for periods up to 700 days.

Extensive pleural adhesions developed in hamsters in 3 groups treated with chrysotile preparations having mean fiber lengths of 32.5 to 38.9 microns as measured by optical microscopy and 5.3 to 6.9 microns as measured by electron microscopy. In these 3 groups, intrathoracic tumors with characteristics of pleural mesotheliomas developed in 8, 9 and 10 hamsters, respectively.

Three other groups of hamsters were treated with preparations of these chrysotiles after further milling that reduced mean fiber lengths to 0.37 to 0.86 microns as measured by electron microscopy. Only rare fibers exceeded 5 microns in length. These 3 preparations induced relatively thin pleural adhesions. No mesotheliomas occurred in hamsters treated with them.

The findings afford evidence that fibrogenic and carcinogenic actions of chrysotile are related to physical properties of the fibers.

:TS

MOVAL OF MERCURY VAPOR

American Optical Corporation

:ient for removing mercury vapor from
rmance of these materials in respirator

'OR

ation, Gaithersburg, Maryland

Bureau of Mines have jointly funded the
Metabolic Simulator (BMS). The BMS
abolic parameters required for complete
, monitoring, support, and resuscitation
reathing and metabolic simulation are
rate, breathing depth, breath velocity
release are all variable over wide ranges.
work with respiratory exchange ratios
perventilation. In addition, all of these
ate the use of the device in hostile test
at body temperature and completely
extent of having a variable functional
ace equivalent to that of humans.

ns in test and validation of respiratory
and safer evalu tion in hazardous
ave to be limited. In addition, it will
cases where simulation chambers with
including standby physicians. Perhaps
l and reproducible test and validation

ulator is currently under development
puter control. Through a typewriter
into the computer which will then
lesired sequence of metabolic activities
r will also monitor the test procedures
eration will be indicated in a motion

CATION

Department of Pharmacology,
California

terized by changes in perception,
observed. In neither case was there
wed exposure to manganese fumes
ect; case 2 resulted from inhalation of
nese blood levels were raised in case
red by prolonged disability and slow

ABSTRACTS

191. THE CARCINOGENICITY OF CHLORO-ETHERS. STRUCTURE — ACTIVITY RELATIONSHIPS

B. L. VanDUUREN, Sc.D., C. KATZ, and B. M. GOLDSCHMIDT, Ph.D., Institute of Environmental Medicine, New York University Medical Center, New York, New York

In 1968 we reported to this Association on the carcinogenic activity of chloromethyl methyl ether and bis(chloromethyl) ether in mice and rats (A.I.H.A. conference, St. Louis, Mo., 1968; also, B. L. Van Duuren, *et al. A.M.A. Arch. Env. Health*, 16, 472 (1968)). Since that time we have examined the carcinogenic activity of a series of structurally related chloro-ethers in which the chlorine atoms are α- or β- to the ether oxygen atom, and including open chain, flexible and rigid cyclic structures. Tests have been completed on 15 compounds in this category. The animal test systems include skin application in ICR/Ha mice and subcutaneous injection in mice and Sprague Dawley rats. In addition to bioassays stereochemical studies were carried out on the compounds tested, also, the chemical reactivity of the compounds tested were examined by: (i) measurement of rate of hydrolysis in an automatic-titrating ph-Stat; (ii) the nature of the products formed during hydrolysis; (iii) the reactivity of the compounds with nucleophilic reagents. Some of the compounds examined in our work are widely used in chemical industry and may pose serious occupational hazards. It is therefore important to know how information about chemical structure, reactivity and stereochemical aspects can be sued to predict carcinogenic potency in this series of compounds.

Supported by USPHS Contract PH 71-2020 from the National Cancer Institute and grant ES 00260 from the National Institute of Environmental Health Sciences.

192. FIBROGENICITY AND CARCINOGENICITY OF AMOSITE, CROCIDOLITE, AND CHRYSOTILE IN ANIMAL EXPERIMENT

A. L. REEVES, Ph.D., H. E. PURO, M.D., A. J. VORWALD, M.D., Ph.D., School of Medicine, Wayne State University, Detroit, Michigan; and R. G. SMITH, Ph.D., School of Public Health, University of Michigan, Ann Arbor, Michigan

Rats, rabbits, guinea pigs, and hamsters were exposed to the inhalation of one of three types of asbestos dust at a mean atmospheric concentration of 48 mg/m³ (fiber diameter 0.2-0.5, fiber length 3-15μ) on a 16 hr./week schedule for about 2 years, and additional animals were injected with these dusts intratracheally, intrapleurally, or intraperitoneally. Histopathologic studies were performed. Amosite was more fibrogenic than crocidolite or chrysotile, but did not provoke any neoplasia. Chrysotile caused 5 mesotheliomas in rats after intrapleural or intraperitoneal injections and crocidolite caused 6 mesotheliomas in rats and rabbits after the injections and 2 pulmonary carcinomas in rats after inhalation. Guinea pigs and hamsters developed no neoplasia but responded with more severe fibrosis than rats or rabbits. The fibrogenic property of asbestos fibers might be inherent in their silicate lattice; their carcinogenic property is perhaps due to associated trace metals.