FILE NAME: Union Carbide (UC)

DATE: 1965 Sept 21

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1447
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Mr. D. C. Willard

Building 8-96-2

April 28, 1967

E. Q. Hull, M.D.

Particulate Matter in Air
Asbestos Dust
Project No. IH-PAR-76-67

Dear Don:

As per our telephone conversation today, I am attaching a resume' of our determinations of dust breathed by the employees while cutting and installing "kale" insulation.

We feel that further air sampling is needed to give you more meaningful conclusions as to the best protection for the employees handling this material.

At your convenience, we will be glad to discuss these findings with you. In the meantime, if you would keep us informed of jobs pertaining to cutting, installing and removing "kayle" insulation, it would be helpful in scheduling the air sampling work.

Thanks,

Bert Murray

Deposition Exhibit No 10
5-14-87

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General Foremen's Office

PARTICULATE MATTER IN AIR

Dust Breathed by the Employees While Cutting and Installing "Kaylo" Insulation

Plant-wide Survey - Plant 514

Authors: H. H. Warwick
B. L. Murray

Date: September 21, 1965
Project No.: IH-1G-65

Doctor Hull, Plant Medical Director, requested a plant-wide industrial hygiene study to determine the potential exposure of insulators to asbestos fiber dust concentrations. Table I gives the results of seven separate tests, including 24 breathing zone level air samples and shows an average dust concentration of 5.2 million particles per cubic foot of air. A "threshold limit value" of 20 mppcf of air has been suggested.[1]

When three employees, or less, hand-cut and apply "Kaylo" insulation, the concentration of dust is considered safe from the health standpoint; however, with 6 men the dust count exceeds the TLV. It is at this phase of the operation that exhaust ventilation should be used. Excessive dust concentrations can be expected when the insulation is removed from piping and tanks. Again, exhaust ventilation should be used to move the dust away from the employees, if possible; otherwise, respirators are advised.

"Kaylo" insulation contains 12 to 13% asbestos and 5.6 to 7.4% crystalline-free silica.[2] This material is received in block and pipe form and the insulator measures and marks the material into appropriate sizes and cuts it with a hand saw. The insulation material is wired into position around the tank or pipe. The tasks of cutting and applying the "Kaylo" insulation are shown in Figures 1 and 2.

The air samples were collected with a midget impinger and a Uni-jet sampler, drawing 0.1 cubic foot of air per minute through impinger flasks containing 10 milliliters of distilled water. Dust counts, made by the Light Field Microscopic Counting Technique, appear in Table I.

This study has revealed that further research work is needed to:

1. Attain an established figure for the "threshold limit value".
2. Utilize exhaust ventilation to remove the dust from the work area.
3. Determine the particle size of the asbestos fiber where the dust count exceeds 5 mppcf.
4. Obtain Range Finding Tests on animals exposed to different percents of asbestos fiber.
5. Continue our plant-wide study in support of these conclusions.

1. Cook, Warren A., and Poole, Robert E., Letter dated February 12, 1962 - The University of Michigan School of Public Health.

2. Poole, R. E., Industrial Hygiene Survey - Construction Insulation Shop, Building 511-2018. Report 62-IH-1-G-1 (March 21, 1962).

TABLE I

PARTICULATE MATTER IN AIR

Dust Breathed by Employees While Cutting and Installing "Kaylo" Insulation

Date	Sample Number	Sampling Conditions at Breathing Level	Number of Employees	Dust Count MPPCF (1)
11-16-64	1	5-min. cutting, 5-min. application inside building	2	2.1
	2	Same	2	2.6
	3	Same	2	1.7
	4	7-min. cutting, 3-min. application	2	3.0
1-19-65	5	Cutting and application during entire sampling period - inside building	6	22.5
	6	Same	6	17.0
	7	Same	6	22.5
2-16-65	8	Same	2	3.6
	9	Same	2	1.6
	10	Application of insulation - no hand saw cutting	2	0.3
	11	Same	1	0.1
3-1-65	12	Cutting and application during sampling period - outside building	2	7.6
	13	Same	2	2.4
	14	Same	2	4.0
3-22-65	15	Application of insulating - no cutting - inside building	3	1.9
	16	Same	3	13.0
	17	7-min. cutting; 3-min. application	1	7.3
5-26-65	18	Clean up of insulation from floor - sweeping and shoveling - inside bldg.	2	0.8
	19	Same	2	0.1
	20	Same	2	2.5
6-14-65	21	Cutting and application during sampling period - inside building	2	1.0
	22	Same	2	5.0
	23	Same	2	2.5
	24	Same	2	1.1

(1) Million particles per cubic foot of air.

10-14-65

PARTICULATE MATTER IN AIR

Dust Breathed by the Employees while Cutting and Installing "Kaylo" Insulation

Plant-wide Survey - Plant 514

Figure 1. Sawing block sections. Breathing zone level air sample being collected in the background.

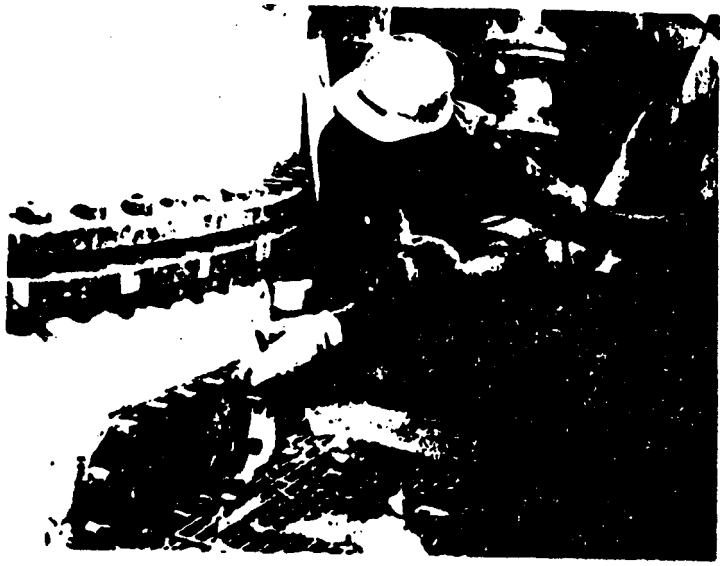

Figure 2. Applying insulation block. Breathing zone level air sample being collected in the foreground.

BLM-

[illegible] 641

PROJECT NO. 111

INDUSTRIAL HYGIENE EVALUATION AND SURVEY

Date 9-11-66 Time 10 [illegible] Project Asbestos Insulation Dust in Air

Department Maintenance Location Cell 13 & 14 Bldg. No. 427

Requested by ______ Reason Survey

General Conditions: Pipe insulation being cut, fitted and secured to lines in cell 13 & 14

Sampling Method and Equipment Midget impingers containing 15 ml [illegible] with [illegible] and [illegible]

Shift: Day ___ Eve. ___ Mid ___ No. Employees ___ Sampled by [illegible] CGC

Sample Number	Zone	Sampling Time-Min.	Flow Rate (l/min)	CONCENTRATION cu ft	Conc. (mpcf)	MPCF	Special Conditions
1		10	2.8	1.0	<0.1	<0.25	Breathing level inside cell 14 at (1st level) insulation being cut, fitted and secured to lines, cutting time approximately 2 min.
2		10	2.8	1.0	0.6	1.5	Same as for No. 1. cutting time 5 min.
3		10	2.8	1.0	0.8	2.0	Same as for No. 1 cutting time 8 min.
4		10	2.8	1.0	0.2	0.5	Breathing level inside Cell 13 - insulation being cut, fitted and secured to lines approximately 6 to 8 ft above floor level by 4 employees
5		10	2.8	1.0	<0.1	<0.25	Same as for No. 4

Calculation:

Remarks: $\frac{\text{Net count} \times [\text{illegible}] \times 250 \times 10^3}{\text{cu ft} \times 10^6} = \text{MPCF}$

Sketch - See Reverse Side. Reference No. 7JHD 45 Analyzed by [illegible] Date [illegible]

[illegible]

1SL 11

PLANT 514

PROJECT NO. IH-66

INDUSTRIAL HYGIENE EVALUATION AND SURVEY

Date 4-13-66 Time 10:00 Am Project Dust in Air (Asbestos Insulation)

floor (north end) Bldg. No. 156

Department Maintenance

Requested by Survey ... nation of Concentration

General Conditions: ... locks (2 ... being cut (sawed) ... application

Sampling Method and ... midget impingers containing 10 mls dist. water ... Wet Sampler

Shift: Day ___ Eve. ___ Mid ___ No. Employees 5 Sampled by HHW-CGC

Sample Number	Zone	Sampling Time-Min	Flow Rate (l/min)	CONCENTRATION Cu ft	Net Count	MPPCF
1		10	2.8	1.0	<0.1	<0.25
2		10	2.8	1.0	0.8	2.0
3		10	2.8	1.0	2.2	5.5

Special Conditions

Breathing level ... employee as he cut insulation ... hand saw. Another employee cutting nearby intermittently

Ditto

Ditto

Calculation:

Net count × $\frac{-.50 \times 10^3}{6}$ = mppcf

Remarks:

Sketch - See Reverse Side. Reference No. 6JND10 Analyzed by J. Bow Date 4-15-66

UNION CARBIDE CORPORATION
270 PARK AVENUE, NEW YORK, N.Y. 10017

MEDICAL
DEPARTMENT

June 7, 1967

Dr. T. J. Hall
Union Carbide Europa A.A.
40, Rue Du Rhone
1211 Geneve 3
Suisse

Dear Tom:

I have reviewed the report, "Asbestos As A Health Hazard In The United Kingdom", prepared by I. C. Sayers, and in general I find that it is reasonably accurate. I do not attach very much importance to the data on the incidence of asbestosis and death from asbestosis and cancer because these are merely tabulations of events and do not take into consideration the numbers of people who were subjected to the possibility of the event occurring.

We had been interested in the possibility that the short fiber Coalinga product might have a greater hazard than the more conventional forms of asbestos because sub-micron silica has been known to cause a rapidly progressive silicosis after exceedingly brief exposure. We were concerned about whether the Coalinga material with its exceedingly fine fibril diameter might have a similar effect in causation of asbestosis. We therefore made some preliminary studies in which the material was injected into the belly cavity of guinea pigs, rats and rabbits and also was injected intratracheally by a method which distributes the asbestos throughout the

Johns Manville for purposes of comparison. In the injection study the Coalinga refined fiber produced the most severe reaction in the belly cavity, whereas the standard fiber and the Johns Manville fiber were essentially the same and less severe. In the injection study in the lung the crude fibers caused a more severe lesion, the refined fiber was intermediate and the Johns Manville fiber was least reactive. The only conclusion we can draw from this crude test is that it is possible that our Coalinga product may be more hazardous to use than long fiber asbestos in that it may induce the disease, asbestosis, at an early time after exposure.

The question was raised whether the 5 million particles per cubic foot were still valid as a Threshold Limit Value. I maintain that this value is still correct in terms of preventing the disease, asbestosis. There is no evidence of asbestosis occurring among people who have worked in an environment where the concentration was kept within the Threshold Limit Value. It is probable that the 5 million particles per cubic foot will not be acceptable for the prevention of mesothelioma. I have no idea what concentration might be effective in preventing this disease and I would wonder whether even a limit of 1 million particles per cubic foot would be effective in this regard.

Finally, I would give my unquestionable support to the request of the Pneumoconiosis Research Council for trace element analysis of the standard sample of asbestos. By so doing we would develop techniques which could be applied to our product from King City and which would be useful in making comparisons with the standards.

I hope this will be helpful to you, if you have any further questions please let me know.

Very truly yours,

C. U. Dernehl

Associate Medical Director

C. U. Dernehl, M.D.
ed

UNION CARBIDE

UNION CARBIDE BELGIUM N.V.

VIREF.
NIREF. 1415 TJH/MLF

BRUXELLES 6, 1 August, 1967
149, AVENUE LOUISE

RECEIVED
SEP 1 1967
T.F. FRANCIS

Mr. Frank Dexter
Union Carbide Corporation
Chemicals & Plastics Division
270 Park Avenue
New York, N. Y. 10017

Re: ASBESTOS TOXICOLOGY

Dear Frank:

During a recent conference on Physics and Chemistry of Asbestos Minerals at Oxford, England, I met with representatives of the group who are coordinating an analytical program for asbestos samples. These were:

Dr. V. TIMBRELL
Medical Research Council
Pneumoconiosis Research Unit
Llandough Hospital
Penarth, Glamorgan. U K

Dr. T.G. MORRIS
M.R.C. Llandough Hospital
Penarth, Glamorgan.

This meeting was to arrange for Union Carbide's cooperation in trace element analyses of standard samples.

Dr. Mumpton, who, incidentally, gave an exceptionally good and well received paper at the meeting, is bringing the samples back to Niagara Falls and is aware of the requirements of the group for analysis. Briefly, they would like to have all possible trace elements analyzed to the highest possible degree of accuracy.

A07094

There are two samples of chrysotile asbestos, one of amosite and, I believe, two of crocidolite. Dr. Timbrell has sizable quantities - close to one ton each of these materials - which have been "thoroughly" blended. In the case of chrysotile he also has samples of the different types from which the standard sample mix was prepared. He asked if we could possibly analyze samples of these original components in order to see if any components were present which might be used as a key to the efficiency of their mixing and blending procedures. Dr. Mumpton agreed to determine the cost of these further analyses to see if we could justify also doing some of them.

We had a lengthy discussion with Dr. Timbrell and Dr. Morris and Dr. Mumpton can fill you in on the details. I believe it is fair to say that there are certainly many questions and problems still unanswered and realistically there is not much evidence yet as to the true "danger" of using asbestos.

I expect to be in New York during the week of August 14 and would like to talk to you more about this and other asbestos subjects.

Very truly yours,

Tom Hall

THOMAS J. HALL.

cc: Dr. C. U. Dernehl. M. D.
Mr. F. Frangos - N. Y.
Dr. F. Mumpton - Niagara Falls
Mr. L. D. Polderman - Office
Dr. A. E. Pufahl - New York
Mr. I. C. Sayers - London
Mr. R. G. Woolery - Niagara Falls

W. S. Young
29th floor
New York

July 26, 1968

L. F. Crow
T. F. Frangos
J. L. Myers

Enclosed is my synopsis of the Industrial Hygiene Aspects of Asbestos for your use in the long range plan.

J A Riddle
J. A. Riddle

JAR/cg
enc:

A07081

INDUSTRIAL HYGIENE

Newspaper headlines, such as "Ovary Cancer, Asbestos Link", "A Strange and Deadly New Cancer Among Asbestos Workers", and the like, have given the public the impression that there is a proven connection between asbestos and lung cancer, mesothelioma, or even ovarian cancer. Even a careful perusal of the newspaper accounts fails to bring out certain important facts:

1. There are four separate and distinct types of asbestos; chrysotile, crocidolite, amosite, and anthophyllite.
2. Crocidolite has been pretty conclusively established as a cause of mesothelioma. If there is a relationship between Chrysotile and mesothelioma, it is much less pronounced.
3. Mesothelioma is still a rare disease. For instance, only 250 cases related to exposure have been recorded in the United Kingdom, where 25,000 cases of lung cancer are diagnosed every year.
4. Crocidolite and Amosite contain hydrocarbons, including 3,4-benzopyrene, and also absorb oil from the jute bags in which they are packaged. Polycyclic hydrocarbons and jute oil have been shown to be carcinogenic under some circumstances. Chrysotile is oil-free and ordinarily is packed in paper bags.
5. Many of the sensational news stories are based upon the finding of "Asbestos Bodies" in microscopic examinations of tissue from various organs. In the original medical reports, the author usually is careful to point out that positive identification of asbestos bodies is quite difficult, that there is evidence that other materials besides asbestos may cause formation of "asbestos bodies", and that only a small number of "asbestos bodies" are seen except in the lung tissue of established asbestosis patients.

The foregoing is an attempt to put the situation in perspective, not to imply that there are no health problems with asbestos. Viewed objectively, there are probably three areas of risk due to exposure to asbestos:

1. Asbestosis, or progressive loss of lung function due to accumulation of asbestos fibers in the lungs, with accompanying fibrosis. Coalinga Chrysotile fibers are believed to be less dangerous than other varieties because the curved fiber shape reduces penetration depth into the lungs, and it is more rapidly eliminated than other asbestos varieties.
2. Mesothelioma is associated with exposure to Crocidolite, but not necessarily to Chrysotile.
3. Bronchial carcinoma is associated with asbestosis, and there may be a synergistic effect when smoking and exposure to asbestos are combined.

It was previously believed that asbestosis would not develop if the dust concentration in the working place were kept below 5 million particles per cubic foot (5×10^6 p/cf). With the long time span between initial exposure and the onset of clinical symptoms it will be evident that a rigorously defined safe limit is not possible. Currently, some environmental health authorities are in favor of lowering the limit, but with no solid evidence as to what it should be.

The King City plant has operated since it started with dust concentrations below $5x10^6$ p/cf in non-respirator areas. A recent sampling indicated $2.8x10^6$ p/cf average in all non-respirator areas, with none above 3.7. The respirator area comprises the dry opening, packaging, and palletizing areas which are walled off from the rest of the building. All personnel working in the respirator area are required to wear USBM-approved respirators.

Customer's problems are in two categories, the pre-trial questions, and the actual problems which arise when they become consumers. For most people the questions are satisfactorily answered, for the moment at least, by the "asbestos toxicology" sheet. In the event of additional adverse publicity, an expansion of the asbestos toxicology sheet may be needed.

Problems of dust control in handling are susceptible to engineering solutions and we can pass on to the customer our experience in dust control and materials handling. The advantages of the pelletized form are obvious.

It will be necessary to maintain liasion with other organizations conducting research and statistical studies in this field. If it can be arranged, publication of reports which put the data in better perspective should be encouraged.

We perform chest x-rays on all new hires as part of the pre-employment physical. Fibrosis or Emphysema are cause for rejection. All employees are given periodic x-rays at intervals determined by their smoking habits, ranging from 2 years for the non-smokers down to 6 months for heavy smokers. The tabulation below shows the number of employees with various periods of exposure.

Number of Employees	Years of Exposure
6	6
8	5
9	4
6	3
33	less than 3

To date, our periodic x-rays have shown no changes from the x-rays taken at the time of initial hiring.

J.A. Riddle
7-25-68

DOCUMENT NUMBER

DATE | INDEXED BY | EDITED BY | PAGE OF | DOCUMENT NO. 3070 | LOCATION

DOCUMENT TITLE: Gross, Paul & deTreville, Robert T.P.:

KEY CODE	KEY WORD OR CHARACTERISTIC	SCOPE NOTES
43	The Pulmonary Response to Coalinga	Not to circulate.
40	Asbestos Dust: A Preliminary	Scientific committee
53	Investigation.	only.
72	Ind. Hy. Foundation, July 1968	
52	FINAL REPORT - NOT PUBLISHED	
80 20		

Evaluation: This study was undertaken to determine the relative pathogenicity of Coalinga chrysotile from California with Canadian chrysotile and other non-asbestos dusts when injected into the trachea of rats. It was found that Coalinga dust produces effects similar to Canadian chrysotile. "The lesions observed in the lungs of these rats suggest that the pathogenic potential of Coalinga dust resembles that of chrysotile dust. Whether this potential is less or greater than that of chrysotile dust cannot be determined from the available data."

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